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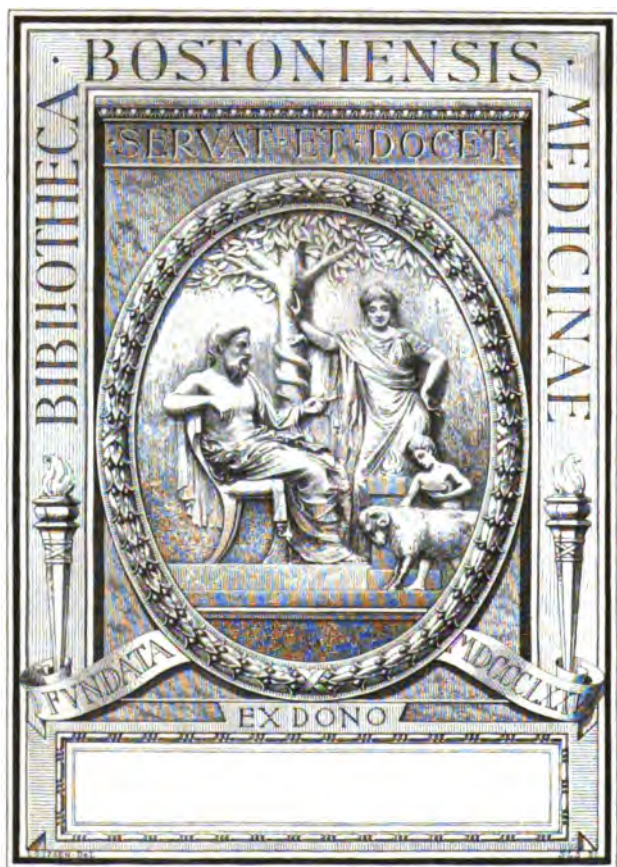
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PROGRESSIVE MEDICINE.

A QUARTERLY DIGEST OF ADVANCES, DISCOVERIES,
AND IMPROVEMENTS

IN THE

MEDICAL AND SURGICAL SCIENCES.

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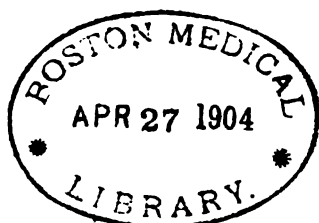
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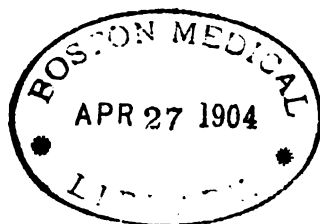
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PROGRESSIVE MEDICINE.

MARCH, 1904.

SURGERY OF THE HEAD, NECK AND THORAX.

BY CHARLES H. FRAZIER, M.D.

SKULL AND BRAIN.

Sarcoma of the Skull. Under the influence of the Roentgen ray a round-celled sarcoma the size of a man's fist disappeared absolutely in the course of two months. The malignancy of the tumor and the rapidity with which it disappeared are the remarkable features of the case. No microscopic examinations were made during the treatment, but there were visible to the naked eye no evidences of inflammatory reaction either in the tumor itself or in the surrounding tissue; it disappeared as rapidly and as effectually as does a syphilitic lesion under the influence of mercury. It cannot, of course, be said that the cure is permanent, for recurrence after this form of treatment, as it would be after operation or any other form of treatment, is always a possibility.¹

Cerebral Pressure. A year ago I called attention to the observation, both interesting and instructive, that had been made by Kocher and his pupils upon the condition of the blood pressure in all conditions in which there was an increase in intracranial tension. Kocher demonstrated by experiments upon the lower animals that when the circulation of the brain was interfered with by an increase of intracranial tension there was a compensatory rise of blood pressure. This compensatory rise of blood pressure was provoked by a reflex stimulation of the vasomotor centre, which so adjusted cerebral circulation that the intravascular pressure equalled or slightly excluded such extravascular pressure as might be caused by any force compressing the cerebral vessels. This compensatory action is, however, limited; so that the extravascular pressure may reach a degree in excess of that which can

¹ Krogius. Archiv f. klinische Chirurgie, Band lxxi., Heft 1.

be compensated for by an increase in the blood pressure, as a consequence of which a fatal bulbar anæmia ensues. Kocher, it may be remembered, divided into several stages or periods the clinical phenomena of cerebral compression:

Stage I. The stage in which the encroachment upon the intracranial space is so slight that it can be compensated for by the escape of a cerebrospinal fluid and the narrowing of venous channels. In this stage the symptoms are in the main insignificant.

Stage II. The second stage in which there is a condition of dysdiamyrrhosis, an obstruction of the venous outflow of blood. The symptoms of this stage are choked disk and such phenomena of cerebral irritation as headache, vertigo, restlessness, delirium, tinnitus, etc.

Stage III. The stage of adiamyrrhosis, in which the compression of the vessels is so great that the brain becomes anæmic, giving rise to certain functional disturbances. If this anæmia is limited to a circumscribed area of the brain the symptoms will be those of local compression. If, however, the compression is so far-reaching as to involve the medulla the symptoms will be those of general compression. This is the period of vasomotor regulation with its characteristic rise of blood pressure which compensates for the increased intracranial tension and re-establishes the circulation of the brain. As the intracranial pressure is increased anæmia or adiamyrrhosis again develops until there is a corresponding increase in the blood pressure; thus, for a time, at least, we have a condition of adiamyrrhosis alternating with dysdiamyrrhosis. The alternations between these two conditions accounts for the rhythmic characteristics of the clinical manifestations of this stage, such as the alterations in the size of the pupil, rhythmic respiratory disturbances, the varying degrees of stupor and other evidences of cerebral irritation or depression.

Stage IV. The final stage is that in which the increased intracranial tension can no longer be compensated for, and is characterized by a rapid fall in blood pressure. The condition of the brain is one of continuous cerebral anæmia which gives rise to general functional inhibition.

Cushing¹ publishes a series of cases illustrating the application of the knowledge derived from Kocher's experiments, and the assistance which may be derived both in diagnosis and treatment by systematically recording the blood pressure. Of the series of cases four were traumatic, one of apoplectic origin. The first case was one of compound fracture of the frontal bone with an extensive extradural hemorrhage, but with no major symptoms of compression. This case illustrated the

¹ American Journal of the Medical Sciences, June, 1903.

first degree of Kocher's classification, the so-called stage of compensation. The clot was of no inconsiderable size, but situated as it was in the so-called silent area of the cortex it made room for itself by displacing the cerebrospinal fluid and gave rise to no circulatory disturbances of the vital centres. In the absence of any other symptoms of compression, headache, which was the only symptom, must have been due to dural irritation. The second case, a simple fracture of the base with symptoms of concussion and a mild degree of compression, illustrates the second or initial stage of manifest cerebral compression. Daily observations were made and showed a decided increase in blood pressure due to two conditions: one the increase of tension caused by the intermeningeal hemorrhage, the other the increase in tension due to the cerebral edema that attends concussion. Usually the effects of compression and concussion are distinguishable as they were in this case, in so far as the blood-pressure reaction is concerned, since in cases of compression the rise in blood-pressure is rapid, and in concussion slow in onset. In this particular case there was no indication for operative intervention, since the process did not advance beyond that which could be compensated for and regulated by the automatic rise in blood pressure. The third case was one of simple linear fracture of the skull, vault and base, without symptoms of concussion, but with severe symptoms of compression due to the extradural and intermeningeal hemorrhage. This phenomenon of cerebral compression, associated with a steady rise in blood pressure, reaching 300 mg. of Hg, became so severe as to demand operative intervention. A craniotomy was performed, exposing a large clot, which was removed. The dura was opened and an ounce of bloody cerebrospinal fluid evacuated. The result of this operation was most marked and gratifying; the blood pressure dropped rapidly to 260 mm., after opening the skull the slow pulse of compression disappeared as quickly, and the patient made a complete recovery. This case typified the third or maximum degree of manifest cerebral compression. The fourth case is perhaps the most interesting of the series, and suggests the propriety of resorting to surgical measures in the treatment of cerebral hemorrhage, whether or not it be of traumatic origin. The patient was supposed to have fallen from a bicycle, and thirty-six hours after the accident was found hemiplegic and had developed symptoms of pronounced intracranial tension, as evidenced by a blood pressure registering about 300 mg., almost reaching the final and terminal stage of Kocher's classification or that of medullary paralysis.

As in the preceding case, an osteoplastic operation was performed and the symptoms partially relieved by the reflection of the osseous and dural flaps. About 4 cm. beneath the cortex a collection of blood was

discovered and evacuated, a drain introduced to the cavity so occupied, and the bone-flaps loosely replaced. Following the removal of the clot the blood pressure dropped from 360 to 230. The patient's condition continued to improve, and on the third day after the operation the bone-flap was permanently replaced and the scalp wound sutured. This proved to be an ill-advised procedure, as the patient's condition changed for the worse, and on the following day he died of œdema of the lungs and cardiac failure. As to the propriety of surgical procedure in the case of apoplexy, the author expresses his views in the following words :

"The propriety of surgical procedures of this sort doubtless will be questioned by many, and I believe that only in exceptional cases will surgical measures hold out any prospect of success, and then only when the interpretations of blood-pressure observations are utilized as an indication for the necessity of intervention, as well as a means of estimating the degree of vascular relief gained by the trepanation. I am unaware that the attempt has heretofore been made with any rational intent to bring relief to the cases of extensive hemorrhage spreading from the capsule into the corona radiata, and I do not see any reason why we should exclude these cases from possibilities of surgical relief, simply because the hemorrhage lies beneath the cortex, any more than that intracranial hemorrhage in other situations should be allowed to run its course. The majority of the cases of apoplexy which are exposed on the autopsy-table show a large clot more or less readily accessible to operative attack, and one would be much chagrined to have an extradural hemorrhage of corresponding size brought to light post-mortem without an attempt having been made to remove it by operation. The underlying or major symptoms of compression are the same, whether the collection of blood be extradural or within the substance of the brain itself. Whether the extravasated blood in apoplexy is in most instances rapidly coagulated or not can hardly be known until more cases have been explored before death ; but it is presumable that it is, and not improbable that the release of intracranial tension from the elevation of the bone-flap, and especially from the evacuation of the clot, should one have been located, will, by the consequent rapid lowering of blood pressure, tend to check any further hemorrhage, even in case the ruptured artery should not previously have ceased to bleed.

"The therapeutic measure generally advocated in case of intracranial hemorrhage with high-bounding pulse is a purely symptomatic one, namely, 'to bleed' the patient in order to lower blood pressure, the idea being that the persistent high tension is the cause rather than the result of the hemorrhage. If the interpretation of the experimental

work is not at fault, such an abstraction of blood, with the idea of lowering arterial tension, would be absolutely contraindicated, since the high blood pressure is only an indication of nature's effort to overcome the degree of intracranial pressure brought about by the foreign body in order to ward off an anæmic condition of the bulbar centres. Of course, the tension of the foreign body in this case, communicating as it does with a ruptured artery, is equal to that of the arterial tension, and were it not for its remoteness, ordinarily from the medulla, death would almost immediately ensue, just as it does when a hemorrhage takes place in the near neighborhood of the medulla or reaches the fourth ventricle through rupture into one of the lateral ventricular cavities.

"In the course of many of the experiments on compression the effects of bloodletting (the skull still being intact) were tried during the various stages of compression. At no time could any beneficial influences be seen, and if blood were withdrawn from the general circulation at a time when there had been a marked rise in general arterial tension to overcome cerebral anæmia, and in amounts sufficient to lower this vascular tension, the results were almost always disastrous unless a certain amount of reserve power remained in the vasomotor centre, which could once more return the arterial tension to its former level. I do not mean to deny that symptomatic improvement ever follows bloodletting in cases of apoplexy in which the hemorrhages have not called forth pronounced symptoms referable to the vital bulbar centres; but when such is the case anything which tends to lower arterial tension without an associated opening in the skull to correspondingly lower intracranial tension is hazardous, to say the least."

The fifth and last case, recorded for the purpose of illustrating the paralytic stage of cerebral compression, was a penetrating gunshot-wound of the skull, with intracerebral hemorrhage. A craniotomy was performed, but the stage of compression was too far advanced, the vasomotor centre was already exhausted and paralyzed, and though life was sustained for several hours by artificial respiration the patient died. The respiratory failure and vasomotor exhaustion were foretold by the rapidly falling blood pressure.

In briefly summarizing the subjects in the discourse of the case, Cushing draws attention to the following points:

Varying degrees of rapid increase in intracranial tension produce corresponding disturbances in the intracranial circulation. To these circulatory disturbances the symptoms of compression may be conveniently subdivided into four stages, dependent upon the degree of circulatory alteration which has been reached. Each of the stages has its own more or less characteristic symptom-complex.

The major or underlying symptoms originate in the centres situated in the medulla, and are only called out when the degree of intracranial tension begins to approach the arterial tension so that anæmia is threatened. A circulatory condition in the medulla which borders upon anæmia has the effect of stimulating the vasomotor centre. Thus, a rise in blood pressure is occasioned which restores the local circulation. The extent of this rise may be taken as an indication of the degree of advancement of the compression. Beyond a certain point, however, this reaction cannot take place. The vasomotor centre under these circumstances fails, and the respiratory efforts cease entirely.

In conjunction with other symptoms a progressive increase in arterial pressure or a high degree of the same which has been already reached, or a pressure which exhibits from moment to moment great alterations in level may be taken as a certain indication of the advisability of early operative intervention. In case there are localizable symptoms, the site of trepanation is plainly indicated. In case of generalized compression from widespread hemorrhage when there are no localizing indications, the intracranial tension should be relieved by the elevation of a large osteoplastic flap from one hemisphere or the other, with a corresponding opening in the dura.

Every surgeon should familiarize himself with these observations upon the effects of traumatism and hemorrhage of the brain upon the blood pressure. I have made it a rule to estimate the blood pressure in all head injuries, and in some cases have found the records thus made to be of great assistance in determining the advisability of resorting to operative intervention. In one case particularly the blood pressure record determined the necessity of operation: the symptoms of general cerebral compression had not manifested themselves, the presence of fracture could not be demonstrated, nor were there any symptoms indicative of the pressure from hemorrhage, either local or general. The blood pressure, however, was found to be much above normal, and upon reflecting an osteoplastic flap at the site of a contused area of the scalp I found a large collection of blood and very active hemorrhage. The elevation of the flap and the removal of the clot relieved the intracranial tension, and the blood pressure returned to normal. These preliminary observations seem to me of such importance that I regard it to be the duty of every surgeon to pursue these investigations in his own cases. Continued observation and the accumulation of statistics therefrom will, I feel sure, throw additional light upon this subject and broaden the scope of the usefulness of the clinical phenomena in its practical application to the treatment of obscure head injuries.

Cerebral Hemorrhage in Whooping-cough. In *PROGRESSIVE MEDICINE* for March, 1903, mention was made of a case of cerebral hemorrhage complicating whooping-cough as one of but two cases which up to that time had been treated by surgical measures. Since then Brown¹ has published an account of a third case in which he was called upon to operate. The patient, a boy aged seven years, was in the fourth week of a severe attack of whooping-cough when the symptoms of cerebral compression in the region of the motor cortex made themselves manifest. Failing in the first attempt to locate the site of the hemorrhage a second attempt was made, and a clot the size of a white bean was found and evacuated. The operation was successful in every respect, the symptoms were entirely relieved, and the patient made an uneventful recovery. Brown refers to the meagre amount of information upon the subject to be found in the text-books. Holt says that the hemorrhage is always extradural, and that in nearly all cases recovery takes place; he does not state whether or not sequelæ, such as paralysis, convulsions, or other brain lesions are common or not. In the short time in which Brown has been interested in the subject he has heard of two cases in which complete recovery did not ensue—one patient is now an epileptic subject, and in the other the brain is impaired in some other way. Charles W. Townsend collected twelve cases of cerebral hemorrhage due to whooping-cough; five were fatal, and seven recovered. Whether recovery in these was complete or not we do not know. From his personal observations of this subject, Brown concludes that the accident is neither so rare nor so harmless as text-books seem to imply.

The Relation of Head Injuries to Apoplexy. In the last few years there has been a good deal of discussion as to the immediate cause of cerebral hemorrhages in cases which at some previous time have been subjected to trauma. Colley² cites a number of cases and quotes a number of authorities to show how widely at variance are the views now entertained. The question now at issue is whether in the absence of any definite lesion of the vessels or brain substance, such as is found in the syphilitic, the alcoholic, and in the subjects of cardiac or renal disease, an apoplexy or cerebral hemorrhage can be attributed to the effects of an injury which occurred a given time before the hemorrhage and was followed by a period of absolute freedom from symptoms, if symptoms there were. While there are some who go so far as to say that secondary changes in the cerebrum and cerebral vessels sufficient to account for a hemorrhage, even though the injury

¹ New York Medical Journal, April 25, 1903.

² Deutsche Zeitschrift f. Chirurgie, Band lxi., Heft 5 u. 6.

was so trivial as not to cause either subjective or objective symptoms at the time of the accident, the majority of observers have put themselves on record as opposed to the acceptance of such a radical view. Certain it is that trauma may cause definite lesions from any one of which hemorrhage may result—*e. g.*, (a) the traumatic cyst traversed by vessels; (b) vessels situated in areas of softening, and (c) fatty degeneration of the vessels. All these lesions have been demonstrated on the autopsy-table; but before one is justified in establishing the relation of cause and effect between such changes in the brain and the injury it must be proven that before the injury the patient was perfectly well; that there were no evidences of syphilis, alcoholism or cardiac disease, and that the patient was not of advanced years, and, therefore, a subject of arteriosclerosis. As to the differential diagnosis between post-traumatic and the ordinary apoplexy, v. Bergmann says that in traumatic cases the seat of hemorrhage is intrameningeal. A single recent focus in the interior of the brain—*i. e.*, not in the cortex—should in the absence of intrameningeal bleeding speak against its traumatic origin.

Mathis,¹ in his treatise upon this subject, which has been reviewed in a previous number,² concludes that the connection between these secondary hemorrhages and previous injury was difficult to discover because it was difficult to prove that the degenerative changes in the vessel walls were of traumatic origin; at best, he says the establishment of any relation of cause and effect between these two conditions must be more or less a matter of conjecture.

Cranial Nerves. TIC DOULOUREUX. Of all the operations undertaken for the relief of tic douloureux the extirpation of the ganglion is unquestionably the most severe, and attended, therefore, with the highest mortality. According to Abbe³ the complete avulsion of the ganglion is not necessary in the great majority of cases to effect a permanent cure; that equally good results may be obtained by another method much safer and equally efficacious. This consists in the division of the second and third divisions at their exits to their respective foramina and the subdural interposition of rubber tissue. The operation is performed in the following way: the external carotid may be ligated to advantage, a vertical incision over the middle of the zygoma exposes the skull, which is opened by mallet and gouge. This opening is enlarged to an inch and a half in diameter. The dura is separated from the base of the skull, and hemorrhage is controlled by pressing a strip of rubber tissue upon the bleeding-point with a pad of gauze. The nerve trunks now exposed are grasped with artery

¹ Sammlung klin. Vorträge, No. 322.

² PROGRESSIVE MEDICINE, March, 1903.

³ Annals of Surgery, January, 1903.

clamps and divided close to their foramina of exit, and, either by cutting or rotation of the forceps, separation from the Gasserian ganglion is effected. The operation is completed by inserting a piece of rubber tissue one-and-one-half by three-quarter inches between the ganglion and the divided roots. He claims this method can be relied upon for a perfect cure, at least for six years, and that it is simple, speedy, and safe. It is applicable to all cases save those in which the pain is due to a lesion in or behind the ganglion. He goes on to say "it certainly is past dispute that there is no need for the removal of the first branch of the fifth pair in any case of grave tic douloureux unless the origin is to be found in a tumor of the Gasserian ganglion or behind it." While this rule may apply to the majority of cases, it certainly is not a rule without exception. I have operated upon a patient in which the pain was always confined to the distribution of the first division. Several peripheral operations had been performed, but with only temporary relief, so that it became necessary in order to relieve the patient, whose sufferings were intense, to resort to a more radical operation. Accordingly I divided the sensory root of the ganglion.

Abbe has practised this operation five times in the last six years; in one, six years have elapsed; in another, five years; in another, two and one-half years; in another, one and three-quarter years, and in the last, six months. The results have been perfect both as to permanence of cure and persistence of the tissue. Rubber or gutta-percha is the best material for this purpose, as it does not become disintegrated, and apparently does not act as an irritant. I think the majority of surgeons will agree with Abbe's advice not to temporize with any of the peripheral operations in grave cases. It is a much better plan to resort at once to an intracranial operation.

Murphy¹ reported his experience with the treatment of a case of trigeminal neuralgia by intracranial injections of osmic acid. This treatment was recommended by Mr. W. H. Bennett in 1899.² In Murphy's case excision of the ganglion or division of the sensory root was clearly contraindicated on account of the patient's advanced age and the sclerotic condition of his arteries. Abbe's operation was not applicable, as it was the ophthalmic division that was most affected. The technique of the operation as given by Bennett is as follows: "The nerve is exposed through a small incision about half an inch in length directly over its foramen of exit, the line of incision being horizontal and parallel with the eyebrow, in the case of the supraorbital branch and with the normal creases of the face in the infraorbital and

¹ Journal of the American Medical Association, August 22, 1903.

² Lancet, November 4, 1899.

mental branches. The nerve is elevated by means of a blunt hook, and from five to ten minims of a fresh 1.5 per cent. solution of osmic acid injected directly into its substance. An ordinary hypodermic syringe and fine needle are used, and the solution injected in several different places to be sure that every fibre is reached. After this is accomplished a small amount of the solution is injected between the nerve and its sheath in the bony canal. During the procedure a small pledget of cotton is held around the needle to absorb the excess of solution which regurgitates and to protect the skin. Wherever the solution comes in contact with the blood or soft tissues in the wound an immediate blackening results, due to the formation of the hydroxide of osmium. The local action of the osmic acid on the terminal nerve filaments exposed in the wound is probably beneficial, so a small amount of it should be allowed to come in contact with them. After the injection is completed the incision is closed with horsehair or catgut suture; primary union follows, and healing is not interfered with by the action of the acid on the tissues."

The *modus operandi* of this procedure is not definitely understood. The acid may produce a degeneration of the nerve on the proximal side of the injection, or may cause local destruction of the nerve and its terminal filaments. Murphy is inclined to favor the former view because "the pain does not usually subside completely immediately after the operation, as it does when the peripheral nerves are divided or resected, and as it would if the osmic acid produced only a destructive effect. Instead it subsides slowly and gradually, the patient, as a rule, not being entirely free from it for a week or ten days following the operation." The case upon which Murphy tried the method was free from pain when the last report was received, six weeks after the operation.

Apart from the peripheral operations there are four methods, each of which has its advocates, to wit, division of the sensory root, extirpation of the ganglion, division of the second and third divisions with interposition of rubber tissue, and the injection of osmic acid. What are the relative merits of each? For convenience sake they may be divided into two groups, the first two operations constituting what may be called the "central group," the last two the "peripheral" group. There is no question but that the osmic acid method is easier of execution, and for this reason, as well as for others, should be selected in a given class of cases, more particularly in those cases in which the patient's condition was such as to contraindicate an operation of any gravity, and in which it was believed that the lesion was peripheral and not central or ganglionic. As between Abbe's operation and the osmic acid method, the latter is to be preferred for several

reasons. In the first place, it is applicable to neuralgia of all three divisions of the fifth nerve, whereas Abbe's method is applicable only to neuralgia of the second and third divisions; secondly, the osmic acid method is one attended with comparatively little risk to life; whereas, the Abbe operation is almost as grave as those having for their object the removal of the ganglion or the division of its root. Furthermore, despite the fact that in Abbe's series of cases there have been no serious sequelæ, it is quite within the range of possibilities that the piece of rubber tissue which is interposed between the ganglion and its branches might in the rôle of a foreign body act as an irritant and give rise to abscess formation. In comparing the mortality that should follow his operation with that of the other formal procedures, Abbe quotes statistics from a series of operations, many of which had been performed before the technique had been so perfected as it is to-day. In this series the mortality was 17 per cent. If we should examine the records for the last five years of operations performed by surgeons of such recognized ability as Abbe, I am quite sure that we should find the mortality very much lower. Cushing has performed a number of ganglion operations without a death, and I have divided the sensory root three times without a fatality.

As to the second or "central" group, I still believe the "sensory-root" operation has many points of advantage over extirpation of the ganglion. But one objection to the operation on the sensory root has been raised. Keen states that in two cases he was unable to find the sensory root. If this were the experience of every operator the objection would be a very serious one; but it is difficult to understand how one could fail to find the root after the ganglion has been exposed. If the *dura propria* is reflected from the posterior portion of the ganglion the sensory root should be exposed to view, as it constitutes to all intents and purposes a continuation of the ganglionic structure. If it were a separate and distinct body, or if the method of approach differed in any way, or if it was necessary to expose the root at some point more inaccessible than the site of the ganglion, failure to find the root could be accounted for. Following up the investigations inaugurated before this operation was introduced Spiller and myself¹ published the results of a series of experiments which were undertaken to determine whether the posterior roots are capable of regeneration on their intramedullary portion. The advisability of the operation depended largely on the absence of regeneration of these posterior root fibres within the spinal cord, because if the posterior roots are incapable of regeneration it may be assumed that the sensory root of the Gasserian ganglion

¹ University of Pennsylvania Medical Bulletin, June, 1903.

likewise is incapable of regeneration. It is not necessary to record the experiments in detail ; it suffices to say that they resulted in furnishing additional evidence in support of the claim that regeneration in central roots does not occur.

As viewed by other observers, I quote from an editorial in the *Boston Medical and Surgical Journal*, July 9, 1903 : " This result naturally justifies the claim previously made by these observers, that a similar operation undertaken on the fifth nerve for the relief of pain should be permanent. As opposed to this view, there is a certain amount of evidence which goes to show that regeneration may occur in the intramedullary portion of severed posterior nerve roots. This evidence, however, remains somewhat inconclusive, and further experimentation must, no doubt, be undertaken before anything absolutely definite may be claimed. The fact remains, however, that Spiller's experiment, so far as it goes, is of positive value, and should encourage surgeons to resort to the operation to which we have alluded on the fifth nerve, certainly in cases where the extirpation of the Gasserian ganglion is for any reason contraindicated."

Sudden Avulsion of the Peripheral Root for the Treatment of Tic Douloureux. Van Gehuchten,¹ who has made some very interesting observations upon the question of nerve regeneration, suggests another method of treating tic douloureux. As I have been unable to obtain the original article, I quote an abstract by Alexis Thomson from the *Review of Neurology and Psychiatry*, November, 1903 :

" On the basis that the essential lesion in trigeminal neuralgia is located in the Gasserian ganglion, radical treatment is to be directed either toward the removal of the ganglion itself or to the interruption or destruction of the fibres passing from the ganglion to the cerebro-spinal axis. The division or resection of the nerve trunks on the peripheral side of the ganglion, although followed by a degree of chromolysis in the ganglion cells, does not lead to their permanent degeneration ; hence the possibility of regeneration of the nerve fibres and recurrence of the neuralgia. On the other hand, if the sensory root of the fifth nerve be divided on the cerebral side of the ganglion, all the sensory fibres of the bulbospinal root undergo complete degeneration, a result which is equivalent to removal of the ganglion itself. Division of the fifth root above the ganglion is not only an easier operation than that of removing the latter, but has the advantage that the connections of the ganglion with the periphery are left intact, whereby the distressing ocular complications are prevented. While this operation has been completely successful in the hands of Frazier,

¹ *Nervaze*, 1903, vol. v. f. 2, p. 199.

Keen, and others, it is still a formidable undertaking, only a little less so than removal of the ganglion, and Van Gehuchten proposes to bring about a similar degeneration in the fibres of the sensory root by less severe measures. As a result of experimental work on the vagus, sciatic, and other nerves, he believes that the violent and sudden avulsion of the peripheral trunks of the fifth would suffice to bring about such a degeneration both in the nerve cells of the ganglion and in the fibres of the sensory root between the ganglion and the brain. On theoretical and experimental grounds, therefore, he recommends the trial of the avulsion method before having recourse to the more formidable intracranial operations."

COMPLICATIONS. Among the possible complications of intracranial neurectomies is permanent or temporary paralysis. Tiffany, in a series of cases collected by him, reported several examples; a single example of the complication was reported by Collins.¹ An attempt was made to avulse the ganglion, but the hemorrhage was so profuse that he contented himself with tearing away as much of the ganglion as he could by traction on the stump of the second and third divisions. On the second day there was complete paralysis of the upper eyelid, of all the muscles supplied by the third, fourth, and sixth cranial nerves, and partial paralysis of the left upper and lower extremity. Six months after the operation the paralysis, which was attributed to the pressure of the retractor, had entirely disappeared.

Peripheral Operations for Tic Douloureux. If but one of the three divisions of the trigeminal are involved it is perfectly proper to perform a peripheral operation, but the operation should be so radical as to remove a sufficiently long section of the nerve to make reunion of the central and peripheral segments at least improbable if not inconceivable. Cook² describes an operation for removal of the second branch of the fifth, which was perfected by the late Melancthon Storrs, of Hartford. He cut the nerve at the foramen rotundum, removed a section of an inch and a half, and brought the distal end of the nerve into the mouth between the alveolus and the upper lip, leaving the divided ends of the nerve some three inches apart. The technique of the operation is as follows: With the patient half reclining in a rocking chair an incision is made along the edge of the orbit down to the bone, and the periosteum is separated back to the sphenomaxillary fissure. Having located the infraorbital nerve, the overlying bone is removed, the nerve exposed, and a ligature thrown around it. The nerve is divided on the proximal side of the ligature, and by making slight traction on the ligature the nerve can be brought into view, and

¹ *Annals of Surgery*, May, 1903.

² *Ibid.*, June, 1903.

can be followed back to the sphenomaxillary fissure, and thence to the foramen rotundum. A loop of wire held with a small snare is passed over the ligature and nerve down to the foramen rotundum, where the nerve is cut and removed. The distal end of the nerve is passed into the loop of a threaded needle and carried into the mouth between the alveolus and upper lip, where it is divided.

EXPOSURE AND RESECTION OF THE AUDITORY NERVE IN THE CEREBELLAR FOSSA. As far as I know this operation has been practiced but once, and in that case the patient unfortunately died of pneumonia five days after the operation. Krause¹ recommended and performed the operation upon a patient suffering from tinnitus aurium. On account of the danger of injuring the sigmoid and superficial petrosal sinuses and the danger of injuring the facial nerve in attempting to approach the nerve in the middle cerebral fossa, he decided to approach it through the posterior fossa.

Cerebral Sinuses. The danger of removing fragments of bone from a fracture over the cerebral sinuses was illustrated by the case reported by Curtis.² The patient had received a gunshot-wound of the *longitudinal sinus* near the torcular Herophili; the wound of entrance was just below the occipital protuberance. Following the removal of the fragments under ether anæsthesia there was a most alarming venous hemorrhage which could be controlled only partially by packing. Openings in the skull were made above and below the seat of fracture, and an attempt, which was only partially successful, was made to close the wound with sutures; the patient recovered from the effects of the injury with a hemianopsia. While attention has been drawn to the danger attending the removal of fragments over wounds in sinuses, the danger has not been emphasized as much as it should. In over one-half of the cases of such injuries hemorrhage is controlled by the dislodged fragments. The breach in the skull is seldom large enough to permit of easy access to the sinus, so that while the surgeon is enlarging the opening there is danger of great loss of blood until sufficient bone has been removed to give the surgeon complete command of the bleeding-point. Curtis says the fragments should not be disturbed.

Riegner³ reported a case of subcutaneous rupture of the *longitudinal sinus* in a young man who fell a distance of twelve metres. The appearance of choked disk and symptoms of cerebral compression prompted Riegner to trephine; the hemorrhage was so profuse that it was necessary to tampon the wound, but four days later the packing

¹ Beiträge zur klin. Chirurgie, Band xxxvii., Heft 3.

² Annals of Surgery, June, 1903. ³ Deutsche Zeitschrift f. Chirurgie, Band lxii.

was removed, and a rent $1\frac{1}{2}$ cm. long was discovered and closed with sutures. During the convalescence, which was uninterrupted, there were no evidences of thrombosis.

THROMBOSIS OF THE CAVERNOUS SINUS. A very interesting and instructive paper appertaining to this lesion, by Dwight and Germain¹ was reviewed in *PROGRESSIVE MEDICINE*, March, 1903, since which time our attention has been called to a case which had been reported previously by Voss.² The operation which he describes and executed has been performed but three times, once by Hartley, once by Dwight, and once by Voss. But one of these cases survived the operation. The procedures in the operation of Voss correspond very closely to those designed to expose the Gasserian ganglion. The sinus is found mesial to the first and second branches of the ganglion, and may be opened and drained at that point. If the thrombus originated in the orbit, Voss suggests that the skin incision should be carried forward to the outer canthus. The outer wall of the orbit may then be opened and the posterior part of the outer wall removed by forceps until the optic foramen is opened. This exposure will be sufficient to enable one to open and drain the sinus at this point.

Cerebral Abscess. CORTICAL ABSCESS. Hotchkiss³ operated upon a case in which an abscess had developed three months after a comminuted fracture of the skull. The abscess was situated close to the motor area, but it had given rise to no motor symptoms. The absence of pressure phenomenon was probably due to the fact that a large opening in the skull had been left by the removal of several fragments at the time of the accident. The patient developed a hernia cerebri which had to be cut off at various times; his further recovery was uneventful.

Sclerosis of the Brain Cortex Simulating Tumor. The patient who was operated upon by Dr. George Woolsey⁴ had had attacks typically Jacksonian in character, and these together with the other symptoms led him to believe that the patient had a tumor involving the cortex of the brain. Osteoplastic resection of the skull was performed and the motor area of the brain exposed. The brain was found to be pulseless, and in the motor area and beyond it a marked change in color was noticed. The color was yellowish, and consistency firm. Two soft areas, however, were found from which a small amount of serosanguineous fluid was removed. The area of the brain which pre-

¹ Boston Medical and Surgical Journal, May 1, 1902.

² Centralblatt f. Chirurgie, November 22, 1902.

³ Annals of Surgery, July, 1903.

⁴ Transactions of the New York Surgical Association; Annals of Surgery, February, 1903.

sented these abnormalities in color and consistency was irregular in outline, and extended from behind the arm centre downward and forward over the motor area. Two small sections of this altered brain tissue were removed for microscopic examination, and proved to be a sclerosis, probably due to a specific arteritis; although nothing was done except to relieve pressure, the operation was followed by a marked and lasting improvement. The previous continued administration of mixed treatment had yielded no results.

Cerebellum. CEREBELLAR ABSCESS. The difficulty associated with the localization of lesions in the cerebellum, particularly with reference to the side affected, was encountered in Greuning's case.¹ The symptoms pointing to abscess were retardation of the pulse rate, drowsiness, vomiting, and a rapidly developed neuritis. Both ears were affected, but the left more seriously so; the mastoid cells were filled with pus and broken-down tissue, and one of the ossicles, the incus, was carious. For this reason Greuning suspected the lesion to be on the left side; accordingly the left temporosphenoidal lobe and left cerebellar hemisphere were exposed and freely aspirated, but with negative results. At the post-mortem a large abscess was found in the right cerebellar hemisphere.

There are several interesting features in the case of cerebellar abscess about to be recorded. After an operation for mastoid disease, certain symptoms, lowered rate of pulse and respiration, pointing to intracranial pressure, developed; with the exception of the headache, which was referred to the nape of the neck, there was nothing suggestive of a cerebellar lesion. During the administration of the anæsthetic, preparatory to exploring the cerebellum, respiration ceased, but was restored by artificial means after a period of an hour and twenty minutes, and continued for thirty hours, when there was a slight intermission of three minutes immediately preceding the death of the patient. In an attempt to explain this phenomena, at first thought one would attribute them to pressure, but it is difficult to understand how pressure could be exerted on the respiratory centre and on this centre alone. Andrew,² in discussing the case, questions whether the abscess, which contained but a small amount of pus and was situated some distance from this centre, was sufficient to account for the pressure. At the post-mortem an œdematous brain and internal hydrocephalus were found. It is much more likely that the increased intracranial tension consequent upon these conditions caused the respiratory embarrassment and ultimate arrest. Macewen regards them in all cases as very serious complications, and calls attention to the importance of paying the closest atten-

¹ Medical Record, October 3, 1903.

² British Medical Journal, May 2, 1903.

tion to the respiration when the patient is under an anæsthetic. When the bone was removed and the dural flap reflected it was observed that there was no visible pulsation and no bulging. This condition is quite exceptional in the presence of tumor and abscess, but sometimes is observed when the lesion is deep seated. The presence of visible pulsation and the absence of bulging should not, as in this case, deter the operator from making an exploration. The failure in this case on the part of the operator to find the abscess may have been due to the fact that the hollow needle which he used for exploration may have become clogged up with brain tissue. Had sinus forceps been used the abscess could have been evacuated.

CEREBELLAR TUMORS. The most conspicuous contribution of the year to the surgery of the cerebellum, at least in so far as the clinical results are concerned, is Hudson's¹ report of two cases of tumors of the cerebellum. In both the tumors were located and removed, and the patients recovered from the immediate effects of the operation; one of them lived several years before the growth recurred. The operations were performed in the usual manner, a musculocutaneous flap reflected, the skull opened with a chisel, and the opening enlarged with rongeur forceps. In the first case, that of a child aged nine and one-half years, with a cyst of the right lobe, there were several features that are worthy of note. At the first operation when the dura was opened the cerebellum bulged considerably, and several portions were cut away, but the tumor was not found. Despite the gravity of the operation the patient reacted promptly, and on the following day improvement was quite noticeable; the mind was clear; the facial paresis was scarcely noticeable, and the pupils were only slightly dilated. The wound healed per primam, but there was a large hernia cerebelli. Although in the finer movements inco-ordinations were marked, she gained strength continuously until she was able to crawl about and sit up in a chair. Headache, vertigo, and vomiting disappeared, and control of the sphincters was regained. The hernia cerebelli grew constantly, and Hudson decided to perform a second operation. However, the day before the appointed time the patient fell from a chair and struck the back of her head; her condition became precarious. The wound was reopened and a large clot of blood and a cyst were discovered and evacuated. The latter had destroyed by pressure a large part of the right and much of the middle and left lobes. From this second operation the patient again reacted promptly, and in course of time all the symptoms, with the exception of blindness, that were caused by intracranial pressure disappeared. One year after the operation she

¹ American Journal of the Medical Sciences, September, 1903.

was in splendid condition, and continued so for about three years, when evidences of recurrence appeared, but the patient would not consent to another operation. The operation in the second case was still more satisfactory as to its immediate effects in that the tumor was found and removed. It was about the size of a pullet's egg and situated three-quarters of an inch below the surface. In this case, too, the patient reacted promptly from the effects of the operation, with the exception of a peculiar temporary respiratory failure, which lasted for several hours. At the close of the operation the patient ceased to breathe. Artificial respiration was resorted to and continued for an hour, when the patient recovered from ether sufficiently to understand what was said to him. At this time a curious phenomenon occurred. When artificial respiration was stopped the patient made no effort to breathe until he was commanded to do so; he would then bring the voluntary muscles of respiration into play. The first few breaths were deep and full, then gradually became more shallow, and finally ceased, when he was again instructed to breathe. For one hour the respiratory act was kept in play only by repeatedly recommending the patient to breathe; after this the involuntary respiratory centre asserted itself, and the respiratory embarrassment disappeared. Unfortunately the patient developed a serious diarrhoea, which had been present before the operation, and died from exhaustion on the eleventh day. The author attributes these diarrhoeal attacks to involvement of the vagus either by the tumor or by the trauma of the operation.

The results of surgical interference in these two cases are especially encouraging to those interested in the surgery of the cerebellum. The rapid recovery from the immediate effects of the operation was, to say the least, unusual, and reflects great credit upon the operator. In by far the majority of cases hitherto recorded patients have died in collapse either during or very soon after the operation. That both of these tumors should have been localized is a tribute to the careful, painstaking observation and discrimination in the study of the cases. The localization of the tumor in one or the other lobe is in all cases a matter of the greatest difficulty, and in many one of mere conjecture. The points which, in the author's opinion, should be studied with the utmost care in determining the exact seat of the tumor are: (1) The relation of pain, headache, and tenderness in deep pressure to the location of the tumor. (2) The relation of the direction of the rotary staggering movements to the side of the tumor. It is believed that irritative lesions cause rotation away from the side of the tumor and destructive lesions toward the side of the tumor. It is, of course, difficult to decide whether the lesion is irritative or destructive, so that more dependence must be placed upon more positive signs—*e. g.*, one-

sided paralysis of cranial nerves. Hudson suggests the possibility of the tumor producing symptoms on the opposite side, as it were, by countercoup. As the tumor grows the cerebellum is pushed against the solid bony wall in the opposite side, and evidences of pressure of the unaffected lobe may result. (3) Hemiparesis and its relation to the side of the cerebellar growth.

As to the technique of operation upon the cerebellum, the loss of blood may be controlled by making the incision in sections, grasping the bleeding-points of one section before proceeding to the next, by separating the dura with the muscular attachment, and by using aseptic wax. If the brain protrudes to such an extent as to interfere with the necessary exploration it should be cut away. The immunity with which large sections of cerebellar tissue may be cut away without endangering life is a well-established clinical fact. In most cases there can be no doubt that the best results are to be obtained by dividing the operation into two stages.

Of the three cases of tumor of the cerebellum which were reported by Thomas,¹ but one was subjected to operation. The latter consisted in exposing one lobe of the cerebellum in the usual way. The cerebellar tissue was quite oedematous, and immediately protruded through the opening with such force that its substance was lacerated against the edge of the dura. A portion of the tissue was removed for examination, but the condition of the patient precluded any further interference. The dural opening was enlarged to the limit of opening the skull, and the operation concluded by suture of the periosteomuscular flap with continuous catgut and the skin with interrupted silkworm-gut sutures. The patient suffered little shock from the operator's manipulations, but the symptoms were in no way relieved; the coma gradually deepened, and the patient died on the following morning. At autopsy the case proved to be a glioma of the middle lobe of the cerebellum.

TECHNIQUE OF OPERATIONS UPON THE CEREBELLUM. In discussing the technique of operations upon the cerebellum, Krause² speaks of the feasibility of ligating the cerebral sinuses, the longitudinal, occipital, and transverse. In no case, however, should an attempt be made to ligate both the transverse sinuses, as such a procedure would endanger the patient's life. If the localization of the tumor in one or the other hemisphere is impossible, one should not hesitate to expose both hemispheres in one or two sittings, according to the condition of the patient. Upon the exposure of one hemisphere the tumor may not be found; if up to this time the patient has suffered no shock, the operator should proceed at once to expose the other hemisphere. Krause, in order to

¹ Boston Medical and Surgical Journal, September 24, 1903.

² Beiträge zur klin. Chirurgie, vol. xxxvii., Heft 3.

obtain a better exposure of the hemispheres, removes the bridge of bone intervening between the two openings on either side, ligates the occipital sinus, and carries his incision in the dura from one side directly across to the other side of the bony orifice. By this means one is enabled to explore with very much greater freedom the surface of the cerebellar hemispheres.

Krause reports two cases which he operated upon, with the hope of finding and removing a tumor. In the first case two operations were performed, the second after an interval of three weeks. One hemisphere was exposed at each operation, a free incision, 2 cm. to 3 cm., made into the tissue, but he failed to find a tumor. The patient was relieved of many of the subjective disturbances, and lived in comparative comfort for three years. The autopsy revealed an internal hydrocephalus, but no tumor. Attention is called to the fact that an incision 2 cm. or 3 cm. in depth can be made into the cerebellum without occasioning any serious symptoms. This point should be borne in mind, since many tumors are situated beneath the surface, where they can be neither felt nor seen, so that unless this means of exploration is resorted to many tumors might be overlooked. In the second case the bone over both hemispheres, together with the intervening bridge, was removed, the occipital sinus ligated, and the dura reflected. Both sides of the cerebellum were under great tension, and when the dural flap was reflected they bulged so that a thorough exploration of the various surfaces was impossible. Accordingly a needle was introduced into the lateral ventricle and 200 c.c. of cerebrospinal fluid were withdrawn. This so relieved the intracranial tension as to make possible further exploration. No tumor was found, however, and the case was set down as one of internal hydrocephalus. The patient died very suddenly about a week after the operation.

Closure of Defects in the Skull. When operating in the presence of infection—*e. g.*, for caries of the cranial vault with or without a cortical abscess or meningitis—a defect will be left at the site of the operation, large or small, according to the extent of the lesion. In some cases, perhaps, the overlying bone is not affected, the infection is confined to the meninges and brain. No matter which of these conditions is present the technique of the operation will differ somewhat from a craniotomy performed in the absence of infection, chiefly in that some provision must be made for drainage. The replacing of an osteoplastic flap would interfere with drainage, or if the bone had been chiselled the closure of the defect with a celluloid plate (Fränkel's method) would be open to the same objection. Porges¹ recommends the use of

¹ Wiener klin. Rundschau, xvi., Jahrgang, No. 50.

strips of celluloid about as wide as one's thumb. Two or more of these are secured in place by wedging them between the inner and outer tables, serving as a temporary scaffolding, as it were, they protect the brain, prevent retraction of the scalp into the defect, and at the same time allow of drainage, while the defect is very thoroughly and permanently repaired by regenerated bone and fibrous tissue.

Cerebral Tumors. FIBROMA AND CYST OF THE BRAIN. The growth of a fibroma from the wall of a brain cyst is of unusual occurrence. Woolsey¹ records the case of a boy who had been struck on the head with a barrel. Two years after the accident he had an attack associated with sharp pain radiating from the hand to the shoulder, accompanied by twitching, which extended to the face, and gradually developed into tonic spasm. This was followed by loss of consciousness. On recovery there was neither stiffness nor paralysis. There was a repetition of this attack, and in course of time he developed gradually a progressive paralysis of the face, arm, hand, and leg of the left side. These symptoms, together with the headache, vomiting, and optic neuritis pointed toward the existence of a tumor. An osteoplastic flap was made, and upon reflecting the dura the brain protruded to a considerable degree, and its surface began to split spontaneously; through the resulting fissure the bluish cyst wall could be seen. To the wall of the cyst cavity, which measured two by three inches, an oval, hard nodular tumor was attached, which proved to be a fibroma. The tumor was removed, the cyst drained, and the flap replaced. On the evening of the operation the patient could lift his arm and move the hand, and on the following morning the movements of the arm were quite free. His facial paralysis disappeared. Three months after the operation his recovery was almost complete, save that the left hand was not quite as strong as it should be.

Sudden Death after Operation for Brain Tumor. The large number of sudden deaths that have occurred after operations upon subjects with brain tumor has been frequently commented upon. In Simon's² case the patient died in a few hours after the operation; he believes that in this, as in many other cases, death is due to sudden changes in the circulation. For this reason, if the blood pressure is increased by the pressure of a tumor or internal hydrocephalus, the pressure should be relieved at first by practising lumbar puncture, and afterward by opening the skull. A few days should be allowed to elapse between these preliminary procedures and the attempt to remove the growth.

Removal of a Gliosarcoma. On October 7, 1903, Kiliani³ operated upon a patient, aged thirty-two years, upon whom the diagnosis

¹ *Annals of Surgery*, February, 1903.

² *Beiträge zur Psychiatrie Klinik I.*

³ *Annals of Surgery*, April, 1903.

of tumor had been made and ratified by radiographic demonstration. An osteoplastic operation was performed, the flap being fashioned with the Doyen drill and Gigli saw. After reflection of the dura, electric excitation over the entire motor area gave no response. Palpation of the exposed area with the finger revealed no tumor mass, and the insertion of an aspirating needle yielded negative results. An incision two inches in length was then made in the sagittal direction over the suspected area of the cortex, and upon introducing the finger through this incision a tumor densely adherent to the surrounding structures and apparently pedunculated below was found situated one-quarter of an inch to three-quarters of an inch below the surface. The tumor, which was removed by blunt dissection, presented the shape and size of a small hen's egg, one and seven-eighths inches long and one and five-eighths inches broad. The patient's recovery from the operation was uneventful. On the seventh day he began to use the affected arm and leg, and since that time the improvement has continued. His facial paralysis has practically disappeared, and his speech, though somewhat impaired, is fairly good. The tumor proved to be a gliosarcoma composed of small round and spindle cells.

A Clinical Note Eight and One-half Years after Removal of a Cerebral Tumor. It is seldom that one has an opportunity to study the effects of an operation for the removal of a cerebral tumor eight and a half years after the operation. In 1894 Williamson removed a pure angioma from the motor cortex of a woman aged twenty-three years. In order to remove the growth it was necessary to remove a large amount of healthy brain tissue. As a result of the operation the patient exhibited a motor aphasia. Either the greater portion of the cortical centre for speech had been removed or the communicating paths between it and its motor articulation centres in the bulb were divided. When she was discharged she could only use negatives and affirmatives. In September, 1901, Oliver¹ examined her, and found that she was able to make use of a very large number of words; she could name any object that was presented to her, and had no difficulty in the employment of proper names. She had an excellent memory, and could repeat nearly all that was said to her. She read a good deal, read loudly and correctly, and she wrote pretty well. Her difficulty with words was mostly observable when she attempted to carry on a conversation or tried to make up a sentence. She was like a child who was learning to speak; she could supply all the nouns and many adjectives, but could not put in the verbs. The sentences, therefore, had to be filled up by those with whom she was conversing. In talking

¹ British Medical Journal, July, 1903.

of the work which she did in the house she would, in answer to inquiries, use such words as "floor," "beds," "clothes," etc., meaning by these that she scrubbed the floors, made the beds, and washed the clothes, etc. She travelled by herself on the railway, as she could ask for a ticket for the particular station she was going to, which she named readily. In testing her with numerals she counted quickly up to twenty, and could have gone farther. Occasionally there was quite a noticeable delay in reply to questions. Counting backward was impossible to her. When asked what numeral came after 6 she had to begin enumerating from 1 before she could answer. There was thus a very considerable recovery of the power of speech. This Oliver says may be due to "improved nutrition of the remnants of the speech centre in the left side of the brain that escaped the stroke of the scalpel at the time of the operation, or it may be that the right cerebral hemisphere has undertaken the function of speech through education—an assumption to which patients, by having cultivated the use of the left hand in writing, may have contributed."

Cranial Surgery. Cottam¹ calls attention to the failures and the disappointments that are so conspicuous in the past history of the surgery of the brain, and attributes them to the fact that the operations were oftentimes carried out on purely hypothetical grounds. Experimental procedures have yielded unsatisfactory results—they were unsupported by a knowledge of the existing pathological conditions. The development of neuropathology and of cerebral localization marked a distinct advance, but even with these the establishment of a diagnosis is a matter of the greatest difficulty, at times impossible; so that we are forced to resort to an exploratory operation to clear up the case. The perfection of the technique and the introduction of the osteoplastic flap have made exploratory operations not only safe but serviceable. Of the points in technique to which particular attention should be paid may be mentioned rigid asepsis as against chemical antiseptics, the avoidance of prolonged exposure of the brain, the adoption in suitable cases of the two-stage operation, the use of Denges' cannulated sounds or a thin, slender spatula for methodical exploration of the brain for abscess or tumor. He regards the trephine as obsolete, and prefers the chisel, rongeur, and Dr. Vibri's device to the more complicated appliances for performing craniotomies.

Epilepsy. RESULTS OF SURGICAL TREATMENT OF EPILEPSY AND CONGENITAL MENTAL DEFECT. Spratling² gives the results of his observations and experience in the treatment of epilepsy at the Long Island Colony for Epileptics. The type of epilepsy proposed for

¹ Medical News, August 15, 1903.

² Medical Record, September 19, 1903.

surgical treatment should, he says, be specified. "To the analytical student of the disease the word epilepsy, without qualification, carries little meaning. In some cases medical treatment promises most, in others, surgical; and it is well to differentiate the cases of each at the outset, doing this broadly, if not specifically, always reserving, however, specific distinction before undertaking the surgical treatment of any particular case. We may first lay down this general rule: the epilepsies that most seriously impair the conscious operations of the mind are less amenable to treatment by the surgeon than the epilepsies that leave the mind most largely unaffected.

"There is a vast difference between fits of different types in the degree in which they affect the mind. Some blot it out in a flash, completely and instantaneously; others blot it out gradually; others impair it in various degrees without affecting its complete destruction at any time during the fit, while still others do not even disturb it in an appreciable degree, the latter being the case with the milder monospasm, Jacksonian in character.

"This being true, we must first single out the epilepsies that mostly affect the motor side of the body as promising most for surgical treatment, to the exclusion of those that invade the psychical side to the greatest degree.

"I may illustrate this by saying that in *grand mal* convulsions, in which consciousness is destroyed through the intensity of the "explosive discharge," or through the "sudden snapping of restraint" in the motor zones, surgical measures are far more rational than when the attacks, being psychical, are silent in form, causing no commotion in the muscular system and no change in body posture.

"Operations for the possible relief of epilepsy should be confined to cases in which the attacks are of *grand mal* or Jacksonian type, and will seldom be found of any use in the *petit mal* or psychic types.

"This takes no account of partial, reflex, or other rudimentary forms of the disease, many of which are well adapted to surgical treatment, being due as they are to such causes as old cicatrices, an adherent prepuce, foreign growths in the nose, middle-ear disease, and other peripheral organic conditions, including recent injuries to the brain, in which the early repair of the damage removes the cause of the attacks."

RESULTS OF BRAIN SURGERY IN THIRTY-THREE CASES OF EPILEPSY. The types of epilepsy in which surgical intervention is oftenest a rational proceeding comprise the bulk of all the epilepsies. In 1325 cases that have come under Spratling's observation during the past eight years 774 were *grand mal* and 9 Jacksonian; together a little over 60 per cent. of the gross number. He does not wish to be understood as stating that 60 per cent. or over are subjects for surgical treatment,

but means that it is among 60 per cent. only that some cases will be found that surgery may benefit.

In general it may be said that the majority of cases of epilepsy are *grand mal*, and among these alone are the cases suitable for surgical treatment to be found. The following observations should be made before operation is performed in any case: The patient should be watched so that the exact order of invasion, the precise manner in which the fit begins, the manner in which it extends, involving one group of muscles or one part of the body after the other, should be carefully observed on repeated occasions, together with the nature, frequency, and recurrence of the aura. All these constitute valuable signs that help to guide us to a knowledge of the cerebral seat of the disease. The study of such symptoms to their full advantage demands a knowledge of cerebral localization that we cannot, either as epileptologists or as surgeons, fail to acquire.

Some idea of the value of the surgical treatment of epilepsy may be gathered from the results in 33 cases that have been under Spratling's observation for varying periods of time. The average duration of the epilepsy was approximately five and one-half years. In 21 cases there was no improvement in the disease, either temporary or permanent; in 8 the attacks were lessened in frequency and severity, the operation being a part of the treatment only; in 3 the disease was much worse after the operation, and in 1 there was apparent recovery, but in this case the operation on the brain did not relieve the convulsions. The relief was due to the removal of a cause that periodically produced a form of autointoxication.

Of the series of 33 cases, 5 were operated on at the Colony, and careful records kept of the number of convulsions, with the following results:

| | | | | | | |
|---------|-----------------|---------------------|---|---|---|---------------|
| Case 1. | During 4 months | preceding operation | . | . | . | 1031 attacks. |
| | " 20 " | following | " | . | . | 51 " |
| Case 2. | " 4 " | preceding | " | . | . | 24 " |
| | " 4 " | following | " | . | . | 14 " |
| Case 3. | " 11 " | preceding | " | . | . | 125 " |
| | " 11 " | following | " | . | . | 60 " |
| Case 4. | " ? " | preceding | " | . | . | ? " |
| | " 12 " | following | " | . | . | 45 " |
| Case 5. | " 5 " | preceding | " | . | . | 242 " |
| | " 5 " | following | " | . | . | 54 " |

The results in these cases, all of which had been operated upon before, were not encouraging. The percentage of recoveries was *nil*, and the percentage of improvement 25 per cent. The apparent improvement should not be laid to the effects of the operation, but may well have been due to the definite after-treatment which was applied.

The more favorable statistics that have been published from time to time cannot be accepted, because in the majority of instances the cases are kept under observation but for a short time. Furthermore, the fact that the viewpoint of those who collect them differs, and the type of epilepsy frequently is not specified, makes comparison of statistics almost valueless. If, as Spratling says, we accept two or even three years as the period that should elapse after the operation before results are reported, the rates of recoveries from epilepsy would be disappointingly small.

SURGERY IN CONGENITAL MENTAL DEFECT. While the results in epilepsy were anything but encouraging, those obtained in the *idiot* and *imbecile* are still less so. One has but to know the pathological conditions underlying idiocy to realize how futile must be any attempt to affect this lesion by surgical measures. Spratling has collected 194 cases, which he divides into two groups, the first group including the more immediate results in 111 cases, the second group results somewhat more permanent in 8 cases :

| | Group I. | Group II. |
|--|----------|-----------|
| Died in consequence of or soon after the operation | 19-17 % | 20-24 % |
| Unimproved | 22-25 " | 54-65 " |
| Slight result, but not satisfactory | 9-10 " | |
| Improved | 48-54 " | 9-10 " |

The improvement noted in these cases was the quieter state of the patient. The results and opinions of those surgeons who have had more or less personal experience are as follows : 1. Roswell Park, 15 cases ; 6 died, 6 improved, 3 quieter. 2. The results of Lamphear in 22 cases were such that he has not performed the operation since 1896. 3. Doyen says : " No. one of my acquaintance in France practises Lannelongue's operation. 4. Of Dana's 22 cases, 5 died, 14 were unimproved, and 3 improved. 5. Lowenstein says the hypothesis of Lannelongue's operation is false ; therefore, the operation is not a suitable one. 6. According to Keen, craniectomy is justifiable in a few selected cases, especially in simple lack of development rather than in cases with extensive lesions. 7. Jacobi says : " The operations thus far performed do not effect what they were intended for ; they do not even enlarge the cavity. . . . If any cases be at all amenable to treatment by such operations they must be those of incomplete premature ossification of the sutures and fontanelles."

The general trend of the opinion of surgeons is against surgical intervention in cases of idiocy, except in a very few selected cases. The improvement that followed an operation may be due to the so-called medico-pedagogical treatment. Certain it is that the latter is the most rational treatment of idiocy ; the growth and development of

the brain cannot be aided by operation, but is dependent upon the stimulus of a true physiological education. The fact that operations are so few now as compared to what they were ten years ago is the strongest argument against its utility in the great majority of cases.

Jacksonian Epilepsy. In the *Montreal Medical Journal*, January, 1903, England cites his experience with two cases of Jacksonian epilepsy. In one case the injury was inflicted with a baseball bat, and the first convulsion occurred nine months later. At the operation it was noted that the brain was discolored (chrome yellow), did not pulsate, and the affected area was depressed. An incision into the centre of the area allowed about 2 drachms of a thick, brownish fluid, with some debris to escape. Presumably the accident caused a hemorrhage from the middle cerebral artery into the motor area. In the second case the patient had been run over; the wheel passed over the parieto-occipital region. Nothing save a hæmatoma was detected at the time of the accident. Three months after the accident he began to complain of symptoms pointing to a lesion of the motor cortex. The skull was trephined over the posterior part of the left middle convolution and over the leg and arm centres. Upon opening the dura the brain did not pulsate, no depressed fragment was found, but the sub-arachnoid space was distended, and presented a surface of a milky hue. Upon opening the space two ounces of cerebrospinal fluid escaped, and the brain collapsed. Around the affected area the brain was pulsating. On freer exploration more fluid escaped, so that England was inclined to believe there was an indefinite cavity or an area of cerebral softening. At all events, there was no distinct cyst wall.

Echinococcus of the Skull. There has been placed on record but five cases of echinococcus of the skull; one of these was observed recently by Stolz. The lesion was first noticed during the eleventh year, when there appeared some evidences of cerebral compression, atrophy of the optic nerve, and abnormal growth of the skull. Fourteen years later the patient developed epilepsy, and ten years after that tumor developed upon the skull. The largest bony defect was situated upon the vertex of the skull, and was 16 cm. long and 5 cm. broad. The course of the disease was slow; twenty-seven years after operation the cyst became infected and an operation became imperative. The patient died three weeks afterward. At the autopsy an advanced internal hydrocephalus and a non-parasitic cyst in the right hemisphere were found.

Loss of Brain Substance. Kiati¹ reported one of those peculiar cases in which there was extensive loss of brain matter without the

¹ Medical Record, October 17, 1903.

slightest impairment of intellectual faculties. The patient was preparing to spring a hole with dynamite in which six sticks of giant powder were inserted. They exploded accidentally while his face was directly over the hole and inflicted a ghastly injury. The eyes were blown out; the orbital plate of the frontal bone was driven into the brain, and the brain substance exuded through the opening on to the cheek. The membranes and frontal lobe were lacerated. On enlarging the opening twenty stones and fragments of bone, and about one ounce of brain matter were removed. It seems incredible, but the patient never lost consciousness, and his mind has been perfectly clear.

Fractures of the Base of the Skull. The introduction of the principles of antiseptics into the treatment of basal fractures has resulted in a very material reduction in the mortality, so that to-day the prognosis as to recovery from the immediate effects of the injury is good. Most of these cases are lost sight of after they have recovered sufficiently to leave the hospital, and, as a rule, no attempt is made to follow up the case for the purpose of investigating the late or after-effects, and thereby furnish reliable data upon which to base the ultimate prognosis. We are indebted to Graf,¹ of the staff of König's surgical clinic, for a careful analysis of some 90 cases of fracture of the base which were treated from 1896 to 1902 in the Charité. Of these, 52 per cent. had fracture of the base alone, and in 48 per cent. a fracture of the convexity; 63 cases were due to a fall from a distance, 12 were run over, and 10 received blows on the head. As to the direction of the fracture, 29 were longitudinal or oblique, 21 transverse, and 8 sustained multiple fractures. In 31 cases the line of fracture was unknown. Of 90 cases, 28, or 31 per cent., died as the result of the injury, a much better showing than in the statistics published by Chudovsky, in which the mortality was 64.2 per cent.; 21 of these died within the first twenty-four hours as the result of the injury to the brain itself; 4 on the second and third day, and 1 each of meningitis on the sixth, ninth, and eighteenth day. From these figures it is evident that the danger of subsequent complications is slight, since, if the injury to the brain is not immediately fatal, a majority of the patients recover. Especially noteworthy is the relatively infrequent appearance of meningitis. Excluding one case, in which the patient was admitted after meningitis had already developed, there were but two deaths from meningitis in this series of cases. There is no question but that the modern method of treating basal fractures is largely responsible for the diminished mortality. It must not be forgotten that meningitis may develop sometimes even weeks or months after the fracture was sustained. The

¹ Deutsche Zeitschrift f. Chirurgie, May, 1903.

entrance of micro-organisms from the nose through the line of fracture in the ethmoid bone is responsible for many cases of so-called late meningitis. It is well known that in repair of fractures of the skull there is very little callous formation, so that the line of fracture often remains patulous for a long time after the infliction of the injury.

The following paralyses of the cranial nerves were observed :

| | |
|-----------------------|----------|
| Olfactory | 3 times. |
| Optic nerve | 1 time. |
| Oculomotor | 3 times. |
| Trochlear | 1 time. |
| Abducens | 4 times. |
| Facial | 24 " |
| Hypoglossus | 2 " |

Paralysis of the auditory nerve was difficult to determine. Disturbance of hearing frequently occurs immediately after the injury, and is attributed to hemorrhage in the middle ear or to rupture of the tympanic membrane. It is particularly difficult to distinguish between an injury of the nerve and a lesion of the labyrinth. If the disturbance of hearing is associated with paralysis of the facial nerve, then it is more than likely that there is a lesion of the eighth nerve as well. There were 6 cases of this type in the series.

Choked disk was present a few days after the injury in four instances, but always in association with other severe cerebral symptoms ; with the exception of 1 case, which persisted for five months, the condition quickly subsided.

Returning now to the general cerebral symptoms most prominent in all cases of basal fracture, we will consider their significance from the standpoint of the prognosis. Consciousness is lost almost always immediately after the injury. Of the 90 cases of this series there was complete loss of consciousness in 74. Of the remaining cases it is quite possible that consciousness may have been lost at the time of the injury, but was recovered before the patient arrived at the hospital. This is, however, the exception and not the rule, as will be seen from the following table :

| | |
|--|-----------|
| Complete loss of consciousness of short duration . . . | 28 times. |
| " " " for several hours . . . | 40 " |
| (of these 21 died) | |
| " " " of several days' duration . . . | 6 " |
| (of these 4 died) | |

But 3 cases exhibited exceptionally mild disturbance of the cerebral centres ; on the other hand, a very large number manifested such disturbances for a longer time. In 23 cases the semicomatose condition lasted more than three days ; in 15 cases there was great restlessness

and nervous excitation. In 4 cases the nervous derangement was such that they were transferred to the nervous clinic.

Of considerable prognostic importance is the character of the pulse ; a pulse continuing full and slow for a period of several days is usually accompanied with other grave cerebral symptoms, either more or less coma, or restlessness, headache, vertigo, vomiting, and the like. Of 16 patients who exhibited this group of symptoms, in 9 there was considerable disturbance for a long time. Long-continued intense headache and vomiting persisting for several days make the prognosis guarded. Of the 48 cases which returned for treatment, 7 of these had complained of severe headache, and all of them exhibited later on some disturbance of their health.

Convulsions, which were not due to meningitis, were observed in 3 cases, but 1 of these patients was an epileptic.

To return now to the disturbances of a more general character which were met with several months or years after the accident, the most frequent of these is headache. Of 48 cases, 34 complained of this condition, the intensity and character of which were very variable. In some cases the pain was described as boring, in others as of a shooting character. In most cases it was referred to the interior of the skull, diffuse in character, although in several cases it seemed to be more localized. In 8 cases the headache could be induced by tapping the skull ; in most cases the skull was distinctly sensitive, and in some cases the entire skull, and in some only one-half ; in 5 cases one-half of the skull was sensitive, and always on the side on which the fracture had occurred. In a child, aged eleven years, who had entirely recovered from a fracture of the base three years ago, a slight blow upon the head caused such intense headache and vertigo that the patient had to take to his bed for twenty-four hours. The next most frequent sequela is vertigo ; this is seldom permanent, and rarely occurs when the patient is at rest ; only in sudden or quick movements of the head and in sudden changes of position of the head. In 27 patients who complained of this complication, 4 attributed it to sudden movements of the head, 6 to bowing of the head, 10 to bending backward, and 7 to a combination of these causes. Vomiting seldom occurs as a sequel ; it was observed seven times. Tinnitus aurium and other unpleasant subjective phenomena were complained of in 16 cases.

A relatively frequent complication of fracture of the base is impairment of memory ; this was noted in the series seventeen times. The so-called *amnesie retrograde*, which has been described by Bouillard and Gussenbauer, was observed three times. This defect in memory extended over a period in one case of an hour, in another case of from three to four hours, and in a third case a period of twenty-four hours

before the injury. It remained permanent in all three cases. There are cases in which a weakness in memory and the possibility of representing what has been seen or heard are not in reality present, but only exist in the imagination of the patient. This weakness in memory is often associated with a depression of other intellectual powers. In conversation these patients seem more or less *distract*, and are particularly slow in giving expression to their thoughts, and the expression of their thoughts is both difficult and confused; sometimes the patients themselves volunteer the information that they have become stupid. Of 11 cases of unquestioned intellectual deterioration, 2 cases exhibited outspoken dementia. More positive signs of paresis were not observed.

Changes in character were observed not only by the patients themselves, but by those in close contact with them. As a rule, this consisted in an unnatural irritability and state of emotion; or the peevish, capricious depression is sometimes aroused to an outbreak of anger and violence. In 15 cases the patients complained of unnatural irritability as compared with their former condition. As a rule, they were conscious of this change of disposition. The condition diametrically opposed to this—*e. g.*, depression, melancholia, and hypochondriasis were seldom observed; in fact, only eight times. In one case the patient in a state of depression committed suicide.

This irritability manifested itself in many patients by great intolerance to the influence of toxic substances, such as alcohol and tobacco; in some cases the smallest amount of alcohol would give them intense headache.

Exaggeration of the patellar reflexes was noted in 10 cases; exceptional depression of the cardiac function was noted in 4 instances. Romberg's sign was quite pronounced in 9 cases, nystagmus in 7. In quite a large proportion of the cases there was some disturbance in the auditory apparatus; in fact in only 12 of the 39 cases was this found to be normal.

Changes which occur in the structure of the brain as a result of these injuries are varied in character, and may be circumscribed or diffuse; one may find minute cerebral hemorrhages, areas of pigmentation, infiltration of round cells in the sheaths of the vessels, and hyaline degeneration of the vessel walls. Degeneration of the ganglionic cells has been observed by Budinger and others. These changes are more or less diffuse, but there are lesions much more circumscribed, as, for example, areas of softening, cyst formation, and cicatrices, which may account for some of the *sequelæ* of basal fracture.

| | |
|--|-----------|
| In a series of 38 autopsies there was hemorrhage from the middle meningeal | 13 times. |
| Widespread subdural hemorrhage over convexity and base | 24 " |
| Contusion of frontal lobe | 25 " |
| " temporal lobe | 21 " |
| " occipital " | 8 " |
| " parietal " | 6 " |
| " cerebellum | 9 " |
| Hemorrhages into central ganglia | 8 " |
| " " pons | 2 " |
| " " medulla oblongata | 1 time. |

From these figures it will be seen that the injuries occur most frequently in the frontal and temporal lobes. From investigations which have been made on animals, changes in disposition and intelligence have been noted in those which have been subjected to an injury of the frontal lobe. On account of the relative frequency of the localization of the injury to the frontal parietal lobes in the human subject after basal fracture, it is not surprising that so many of the sequelæ are of a psychical nature.

Fractures of the Petrous Portion of the Temporal Bone. Patel¹ carried on a series of experiments under the direction of Jaboulay to determine the precise mechanism or *modus operandi* of "isolated" fractures of the petrous portion of the temporal bone. These isolated or independent fractures were first called attention to by Berger, in 1887, and since then but very few additional observations have been made, most of which were verified by autopsy, though some were based upon the clinical phenomena. Of the two varieties—those parallel and those perpendicular to the axis of the petrous portion—the mechanism of the latter is the more difficult to explain. The well-known theories, such as that of irradiation, of increase in the diameter of the skull, and of countercoup, with the exception of that of the latter, do not explain these fractures, and that of countercoup only a limited number of them. Patel employed in his experiments the heads of cadavera from which the brains had not been removed, and produced fractures by applying force in various ways and various directions. As a result of these experiments these conclusions were drawn :

1. There are isolated fractures of the petrous process which have no connection with a line of fracture coming from the vault ; of these there are several kinds : (a) fracture of the tip ; (b) parallel fractures ; and (c) perpendicular fractures.

2. Certain of these fractures may be produced by the direct action of the force upon the petrous process, which may be regarded as a section of bone isolated from the rest of the base of the cranium.

¹ Revue de Chirurgie, April, 1903.

Patel succeeded in his experiments in producing isolated perpendicular fractures by a blow on the base of the petrous process along the line of the mastoid orbital axis. The petrous process breaks at its most feeble point or by penetration of the external into the middle third. The mechanism of the parallel fracture is almost analogous, differing only in that the force is directed along the bimastoid axis ; in certain cases a perpendicular fracture is connected with it. Fracture of the tip of the petrous process is constant in all these injuries ; it is either shattered or torn away or forced out of place.

3. The theory of countercoup should no longer be used to explain fractures occurring under conditions analogous or almost analogous to those described in these observations.

THE MOUTH.

Malignancy in the Lip and Tongue. The May number of the *Practitioner* is devoted entirely to malignant lesions of the lip and tongue, presented by such men as Butlin, Whitehead, Jacobson, Jonathan Hutchinson, and others.

I have reviewed articles by these individuals somewhat at length and with the danger of repetition, because I consider them so instructive. Surely the authors of these articles, who by the way seem to have had much larger experience than the average surgeon of this country, have struck the keynote to the question of treatment of carcinoma of the buccal cavity when they lay so much stress upon the importance of an early and accurate diagnosis and of a proper appreciation of the significance of the precancerous condition. Carcinoma seems to be of a more malignant type in the tongue and buccal cavity than in other portions of the anatomy. At all events, the results of operative treatment in this region are, to say the least, discouraging ; recurrence is the rule rather than the exception. This is true not because of any defects in the operative technique, nor of any peculiar difficulties attending the operation, but largely because the disease is too widespread before the patient has been referred to the surgeon. Though all of the authors of these articles are essentially surgeons, you will find that they have confined their remarks very largely to the question of diagnosis, and have had little to say upon the details of the operative technique. They all agree as to the positive relation of cause and effect between chronic irritating ulcers, ulcers which are the result of previous existing syphilitic lesions, although not necessarily of syphilitic nature, leukoma and carcinoma. They all disapprove and have little confidence in the value of the therapeutic test, limiting its trial to from one to two weeks. They are all equally positive in recommend-

ing operation in the precancerous stage rather than waiting until the disease is so advanced as to make the diagnosis unquestioned. These articles should be read by all medical men. They are of more importance to the general practitioner than to the surgeon, because many of these cases first come under the observation of the attending physician before surgical advice is solicited.

LIP. The experience of Stoker, of Dublin, who has operated upon some 350 cases of carcinoma of the lip, confirms the views which have been entertained for a long while. The lip is one of the most frequent sites for cancer, and operation in this region offers the most favorable results. He has found no evidence that cancer of the lip is due to an inherited disposition, but in almost every case the predisposing cause was smoking, and usually the clay pipe. In his experience it is confined almost altogether to the lower lip, to males and to people over fifty years of age. The well-to-do classes escape because they do not smoke clay pipes, and keep their teeth in better condition; they are not subject to two sources of irritation. There is nothing to be said regarding the technique of the operation. The growth should be removed together with a margin of an inch and a half to three-quarters of an inch of healthy tissue on either side; involvement of the jaw and floor of the mouth should be regarded as a contraindication, but it is quite proper to perform repeated and extensive operations in the event of recurrence attacking the cheek and lymphatic structures. The operation should be a simple one. He objects to the fancy plastic operations, preferred for cosmetic considerations, on the ground that the more elaborate the operation the less probability of recurrence.

DIAGNOSIS OF CARCINOMA OF THE TONGUE. As Jonathan Hutchinson says, "few problems in surgery are of more frequent occurrence than that of the diagnosis between epithelioma and syphilis of the tongue, and certainly none are of more vital importance." The mistake of treating a syphilitic ulcer for an epithelioma of the tongue may be explained in a measure by the following facts: At least 30 per cent. of patients with epithelioma of the tongue will have had syphilis; in 20 per cent. of cases the epithelioma supervenes in the site of old chronic syphilitic glossitis or an existing glossitis; in a certain percentage it is quite impossible to tell until the microscopic examination has been made. The therapeutic test is often fallacious, since it is quite common upon the administration of iodides, with the care and attention that is given to the hygiene of the mouth and the withdrawal of alcoholic stimulants, to observe improvement even when the lesion is epitheliomatous. Furthermore, epithelial cancer has no uniform characteristics; its origin and progress vary greatly; it may appear as a hard-edged ulcer, as a papillomatous projection, as an indurated

plaque, or as a bossy or nodular induration. Thus, in three of these the cancer may be present for a long time without ulceration. The distinction, therefore, that is usually drawn between cancer (an ulcer which is indurated) and syphilis (non-indurated which ulcerates) may be absolutely fallacious. Some of the points which will aid one in making a differential diagnosis are: (1) the site of the lesion—the dorsum of the tongue in syphilis, the sides of the tongue in cancer; (2) the shooting pain of cancer; and (3) the application of Butlin's test. If scrapings are taken from the ulcer they will contain but little epithelium of the squamous type, with small nuclei if the ulcer be syphilitic; whereas, if the ulcer be cancerous, modified epithelium of rounded or oval form, with large multiple nuclei and occasionally cell nests, will be found. If one waits for the signs of the advanced stage which are given in the text-book descriptions, the time for saving the patient's life will have passed. Next in importance to the differential diagnosis between syphilis and cancer is a thorough understanding of the relation between leukoplakia and cancer. The thin white patches and scars often left by chronic superficial glossitis must be distinguished from the dense, white, sharply-defined patches of leukoplakia. The earliest occurrence of the epitheliomatous change in leukoplakia is not easy to detect, but it may be said that *directly localized induration and still more papillomatous growth is recognized surgical intervention is called for*. Inasmuch as no local application can be relied on to cure leukoplakia Jacobson recommends operation in the precancerous stage. Unfortunately, the lesion is often so extensive that the patient will not consent to the total excision. It is only by prompt excision of suspicious ulcers or papillomatous growths that a hope is held out of diminishing the terrible mortality from cases of this origin.

Butlin continues the discussion of the differential diagnosis more particularly with reference to irritating, syphilitic, and tuberculous ulcers. Ulcers due to irritation may resemble cancer, but when the cause is removed they frequently heal. A boric acid or chromic acid solution should be applied, smoking stopped, and a soft diet ordered. In the case of syphilitic lesions many difficulties will present themselves. Butlin himself has adopted the following rules of practice: when warty growths appear in an old syphilitic tongue they should be cut out without delay. If a sore place increases and becomes indurated in spite of the administration of antisyphilitic treatment, it is safer to excise it. The common practice of trusting to a course of mercury and potassium iodide to clear up the diagnosis, even when the signs of past syphilis are well marked, should be abandoned. Even when the microscopic examination of a section is negative, if within a fortnight of strict regimen and treatment the lesion is not decidedly improving, it should

be removed without delay. Ulcers of the tongue which appear to be tuberculous should be excised and submitted to microscopic examination. If they prove to be malignant the tongue should be removed.

Precancerous Conditions. In language both forceful and convincing Jacobson calls to account the medical men of the present time for their inexcusable delay in making a diagnosis and for their failure to recognize the significance of the precancerous stage. In more than three-fourths of his patients there were present conditions which showed an earlier stage out of which the cancer had arisen. *In fact, the chances of a patient with a precancerous condition not having cancer is small.* The conditions of the tongue which may be said to be precancerous are the bald tongue, old ulcers, cracks and fissures, leukoplakia, and old persistent glossitis, with numerous sulci and chronic enlargement of the tongue. (1) The bald tongue is the result of a chronic glossitis, with wasting and destruction of the protective papillæ. Such tongues exhibit a liability to become raw, and then to pass into actual excoriation and ulcers. In such cases the treatment should consist not only in the removal of every possible source of direct irritation, but such patients must avoid anything approaching indigestion if they want to take advantage of every means of preventing cancer; (2) about 75 per cent. of ulcers, cracks, and fissures have been due to syphilis; but while these lesions may have been due to pre-existing syphilis, the administration of the specific treatment will not suffice to cure them. The very best remedy for the topical treatment of these ulcers is acid nitrate of mercury. This will often be successful when boric acid and chromic acid have failed. Failure to effect a cure with acid nitrate of mercury Jacobson regards as an indication for operative treatment; (3) leukoplakia may become cancerous in two ways: a leukoma usually thin may become persistently raw, or a leukoma may be suspected as changing to cancer when a lump or knot of induration makes its appearance; (4) warts in the precancerous stage may appear as a simple wart, as a distinctly congenital lesion, or as a wart starting in secondary syphilis; (5) old persistent glossitis with numerous sulci and chronic enlargement of the tongue.

DIFFERENTIAL DIAGNOSIS BETWEEN CANCER AND PRECANCEROUS CONDITIONS. The two conditions in which the most difficulty is apt to arise are ulcer and leukoma of warty and lumpy type. Jacobson does not place much reliance upon one being able to distinguish between an ulcer of purely syphilitic and one of cancerous nature simply by their physical characteristics. This in many cases is practically impossible in the early stage. Nor does he attach much significance to the therapeutic test, because the activity of the syphilitic element has died out and been replaced by conditions resulting from chronic irritation. The

duration of specific treatment should not exceed one week in cases where the disease is still precancerous and has been so for some time. *If an ulcer has remained unhealed in a patient over forty years of age ; if it has been and is likely to be constantly subjected to the usual irritation ; if especially the patient be of hospital rank, he advises operation.* The more an ulcer tends to creep down the side of the tongue to affect the floor of the mouth the greater the suspicion and the more urgent the operation ; but little importance is attached to the usual diagnostic signs, such as induration, pain, bleeding, fixation, and the like ; the same may be said of the microscopic examination as recommended by Butlin. In the first place, the section removed might not have been taken from the cancerous area, and, secondly, experience teaches us that, even after such an insignificant operation, the rate of the growth increases and the glands become rapidly involved. Furthermore, from the pathological examination it is difficult to recognize the border-line between a precancerous ulcer, wart, or leukoma and an epithelioma, and what boundary there is may be passed insidiously, suddenly, and rapidly.

OPERATIVE TECHNIQUE. I will refer, first, to the operation of Mr. Whitehead. The operation which he performs to-day is practically that which he carried out twenty years ago. In 116 cases in which he has excised the entire tongue (the last 50 without a fatality) there were but 3 deaths—mortality 2.5 per cent.—and these do not detract from the merits of the operation. Whitehead does not favor such preliminary measures as tracheotomy, division of the jaw, or ligation of the lingual arteries. He prefers the ordinary high-backed rocking chair to any operating-table, because it is possible to change the position of the patient from an upright to the horizontal one at a moment's notice. The patient is fastened to the chair in such a way as to prevent any embarrassment of respiration. Seizing the tongue with a pair of forceps and introducing through its tip a traction ligature, the attachments are then divided by a pair of blunt scissors ; beginning at the frænum, one blade is slipped under the mucous membrane along the floor of the mouth and when it reaches the pillar of the fauces the scissors are closed. From this point on a blunt dissector may be used instead of the scissors or scalpel ; the tissues are broken down and torn until the arteries are exposed. Hemorrhage from the arteries is controlled by torsion and not by ligation. At the completion of the operation the floor of the mouth is protected by the application of a varnish which is made by substituting for the spirit ordinarily used in the preparation of Friar's balsam a saturated ethereal solution of iodoform, adding one volume in ten of turpentine. In addition to protecting the wound from contamination, it is also of service in controlling the capillary oozing and deadening the acute sensibility of the

jaw surfaces. The patient is propped up during the night after the operation, is allowed to stay up on the following day, and on the second, if the weather is good, to go out of doors. Whitehead believes that the same careful dissection should be made of the cervical glands as of the axillary lymphatics in operations for carcinoma of the breast.

Jacobson is convinced that the Whitehead or intrabuccal method is in many ways superior to the operation through the floor of the mouth as recommended by Symes and indorsed by Kocher. To the claims which Kocher makes for his submaxillary method Jacobson finds many objections. 1. Access to the seat of operation is quite as good by the intrabuccal method if the cheek is split. 2. Simultaneous removal of the glands is in many cases not to be recommended, because removal of the tongue is of itself a severe operation, and further intervention should be postponed. 3. Preliminary ligature of the lingual, if practised by Cathcart's method, can be carried out even with less difficulty through the mouth. 4. Preliminary tracheotomy can be equally well performed as a preliminary to the intrabuccal method. 5. The advantage from the point of view of antiseptis is certainly in favor of the submaxillary method in that it affords good drainage; but with either method it is almost impossible to keep the field of operation aseptic. There are certain points in the Whitehead operation upon which Jacobson lays emphasis. In cases which are actively cancerous he always removes the entire tongue, because it is never possible to tell by naked-eye appearance whether the growth has crossed the line. An experienced anæsthetist is as indispensable as a skilled operator. If the anæsthetizer has had but little experience, the patient is propped up during the operation, otherwise the head may be low and turned to one side. If the extension of the growth be deep when the frænum is involved it will be necessary to resect the mandible; if less marked it may suffice to remove the incisor teeth. At all events, it is quite as important to cut as wide below as behind the growth. By far the simplest and most effectual method of controlling hemorrhage is that of Mr. Cathcart. A suggestion has been made by Heath that if two fingers be hooked into the pharynx over the tongue so as to draw it forward hemorrhage may be controlled by pressure until a ligature is applied.

One of the most difficult problems with which the operator will be confronted is to decide whether the whole or but half of the tongue must be removed. Patients generally dread the loss of any part of the tongue; if they are assured that by early operation only half of the tongue would require removal, they would submit more readily to operation. There are certain circumstances in which Jacobson believes it justifiable to do the partial operation, as when the disease is in its

precancerous stage; when this stage has passed the precancerous stage, however, removal of one-half of the tongue may be justifiable to a certain limited number of cases, as when the epithelioma is of a warty character with only superficial ulceration—a very rare variety—or in the ulcerated form, when the ulceration is quite superficial and limited beyond all question to the side of the tongue. As to the lymphatic glands, Jacobson recommends the removal of these as a routine procedure; it is impossible to tell in what cases invasion of the glands will follow. Butlin says that 70 per cent. of the cases can be so successfully treated by operation that there is little fear of recurrence *in situ*, but of these 70 probably 30 will die, and as many as 40 of affections of the cervical glands. In point of fact, recurrence occurs more commonly in the glands than locally, and in all probability the glands are involved from the day the lesion becomes malignant, so that subsequent lymphatic involvement may be regarded as of certain occurrence and without very apparent relation to the size and character of the initial lesion. If the operation upon the glands is not performed in the earliest stage it is almost impossible to thoroughly extirpate them. As a matter of routine, therefore, the submaxillary, the submental and the cervical glands should be explored from two to four weeks after the tongue has been removed.

The advisability of undertaking operation in advanced cases when the glands are very much enlarged is open to question. Whitehead recommends the operation because of the relief afforded and of the prolongation of life. Jacobson, too, approves, but only under certain conditions. In this connection he says: 1. "It is no good operating when the glands are involved under the upper third of the sternomastoid, reaching the mastoid process behind and the angle of the jaw in front. This region is one most difficult to dissect or work in at any time, owing to the way in which the attachment of the muscle is fixed to adjacent parts and tied down by different processes of deep cervical fascia. I believe that when glands are affected beneath this part of the sternomastoid those in the pterygoid region are involved also, and division of the muscle will be useless. 2. Operation will, in my opinion, be futile (a) when any of the infected glands are soft, necrotic, and breaking down; (b) when both anterior triangles contain enlarged glands."

In a discussion before the Medical Society of New York,¹ Dawbarn expressed his opinion in favor of the submaxillary route for the removal of the tongue, and said that much time and blood may be saved by tying the external carotid artery. Ligation of the superficial carotid

¹ Medical News, October 24, 1903.

is just as efficacious and not so difficult and time-consuming a procedure as ligation of the lingual. He takes quite the opposite view with regard to the posture of the patient during and after the operation. The advice that is usually given patients to sit up as soon after the operation as possible is, he believes, criminally foolish. The stump of the tongue left is unable properly to control the glottis so as to cover the larynx when swallowing, so that when the patient sits up septic material will almost inevitably enter the air-passages. Dawbarn operates with the patient in the Trendelenburg position, allows no pillows under the head after the operation, and even elevates the foot of the bed, and keeps the patient in this position for several weeks until the stump of the tongue is clean and the saliva uncontaminated. By observing these rules of posture the danger of septic pneumonia will be materially reduced. With the hopes of preventing loss of function in that portion of the tongue which has not been removed, Dawbarn inserts the hypoglossal nerve. Although the results seem to have warranted this step in the operation, it is difficult to understand how a motor nerve can communicate impulses directly to the muscle fibres. As a protective to the tissues he uses aristol; by rubbing this upon the raw surfaces an albuminate will form which will not readily allow of the penetration of septic material. Dawbarn seems to be rather sanguine about the results of operative intervention in carcinoma of the tongue, and says that with modern improved technique a permanent cure can be expected in at least one-half the cases, but I am quite sure that this statement will not be borne out by statistics.

Results. In a series of 33 cases operated upon during the past twelve years by Boyd and Unwin the following results were obtained: "1 free from cancer after eleven years; 1 free from cancer after eight and one-half years, and from another after two and one-quarter years; 2 died from cancer after six years and four and one-quarter years; 1 (frænal) is free after two and one-quarter years; 1 is free after eleven months; 1 recurred in a low gland after four and three-quarter years; 1 recurred in loco (frænal) after three and one-quarter years; 1 recurred twice in glands during the first two years, and these remained free from local or cervical recurrence until death at four and one-quarter years; 16 others recurred within a year; 8 died."

Thus, 48 per cent. had a recurrence within a year; 24 per cent. died from the effects of the operation, but 15 per cent. remained free for a period varying from eleven months to eleven years; about 10 per cent. had a recurrence from two to four years after the operation.

REMOVAL OF THE SUBMAXILLARY GLANDS IN OPERATIONS FOR CARCINOMA OF THE LIP OR TONGUE. In performing a radical operation for carcinoma of the tongue or lip it has been recommended

that not only the submaxillary lymphatic but the submaxillary salivary gland be removed, the latter because small carcinomatous nodules have been found in its substance. Brunn¹ carried out some investigations in order to determine why the submaxillary glands were involved so frequently in these cases. In a number of specimens he found almost uniformly a small lymph node situated in a furrow of the gland traversed by the artery, though separated from the salivary gland by a thin septum. This lymph node is to all intents and purposes in the substance of the gland. It is evidently through the lymph channels leading to this lymphatic gland that the submaxillary gland becomes secondarily involved. The impossibility of determining at the time of operation whether or not the salivary gland is already the seat of metastasis makes its removal not only justifiable but imperative.

Sarcoma of the Tongue. From an analytical study of twenty-nine cases of lingual sarcoma Tripp and Swan² found that the ratio of males to females was about 2 to 1. In a few traumatism seemed to influence the production of the growth. The latter began in most cases in the middle third, less frequently in the posterior third, and occasionally in the anterior third. The tumor may be said to be interstitial; taking its origin from the connective tissue in the muscular substance, and may grow to the size of an orange. In the majority of cases the growth projects and forms a smooth rounded eminence in the dorsum of the tongue almost always covered by mucous membrane. The latter rarely ulcerates or rarely becomes involved by the malignant process. The healthy condition of the mucous membrane covering a lingual sarcoma affords an important sign in the diagnosis of these cases, but it is only on the inferior surface that the mucous membrane will be actually movable, for on the superior surface the membrane is normally bound down by the underlying tissue, and does not slide over the surface of the growth. Fifteen of the tumors of this series were round celled, eleven spindle celled, and one mixed round and spindle celled. A distinction has been drawn between a sarcoma proper and those tumors which are made up of small round cells supported by a reticulum of connective tissue—lymphadenomata. No matter what the microscopic picture, the authors believe that these tumors, which are of rapid growth and do not diminish in size under arsenic and iodide, and which recur after removal, should be grouped with the sarcomata. Perhaps the most common surgical tumor with which sarcoma may be confounded is gumma, especially when the latter is single and deeply imbedded in the tongue. But gummata are frequently multiple; they show signs of degeneration, the mucous membrane gives way and exposes a "wash-

¹ Archiv f. klin. Chirurgie, Band lix., Heft 3.

² Practitioner, May, 1903.

leather" slough, and they respond to the therapeutic test. Only in the early stage might carcinoma be confused with sarcoma. The prognosis as to recovery from the operation is good, as to recovery is fair, certainly better than that of carcinoma. Recurrence occurred in about one-half of twelve operated cases, and in most cases was local. The principles involved in the treatment of carcinoma apply to the treatment of sarcoma. The following classification of sarcoma arising in the muscular substance of the tongue is a modification of that of Butlin and Spencer.

Transhyoid Pharyngotomy. When a tumor involves the base of the tongue and encroaches upon the epiglottis without involving the larynx, it is practically impossible to remove it by the buccal route. In those cases Carless recommends a procedure described by Vallas¹ which has been called transhyoid pharyngotomy. In one of the three cases to which his experience is limited, Carless obtained so satisfactory a result that he gives the method the highest indorsement. The procedure is simple and harmless, and gives an excellent approach to the back of the tongue, to the pharynx, and to the laryngeal orifice. He describes the operation as follows: A vertical incision is made reaching from the symphysis menti to the top of the thyroid cartilage, and a second at right angles to this along the hyoid bone. This second incision is needless, and, indeed, one would do better without it. The vertical incision is deepened through the platysma, and the geniohyoid muscles separated, so as to expose the anterior surface of the hyoid bone. This is cleared by a raspatory sufficiently to enable a pair of bone pliers to be applied, and by this means it is divided in the middle line. The two segments are drawn apart by retractors, and with a little undercutting a considerable interval is obtained, in which is exposed the middle thyrohyoid ligament, and beneath it a pad of fat. Through these structures an opening is made with the knife just above the thyroid cartilage, and the base of the epiglottis cut through a little above the superior false vocal cords. This opening is enlarged by scissors on either side, by dividing the ligament and portions of the thyrohyoid muscles, so as to enable the finger to be inserted, and thus the exact size and situation of the growth on the back of the tongue may be readily defined. It is then merely a question of snipping with the scissors to take away the growth. Incisions are made in either side of the epiglottis well away from the lateral margins, and thereby the segments of the hyoid bone are more easily separated, giving additional space to work in. Next a V-shaped segment is removed from the back of the tongue, including the whole of the diseased tissues, and

¹ *Revue de Chirurgie*, May, 1900.

this without encroaching on the main vessels or nerves, although the left hypoglossal nerve is seen. The bleeding is slight and readily controlled by ligatures. The edges of the V-shaped wound are drawn together at the anterior extremity, but behind it is too extensive for this to be undertaken. Three catgut stitches are employed for this purpose. The two halves of the hyoid bone are stitched together by a catgut suture passed through its periosteum. The central part of the wound is to be left open and a gauze plug introduced, the rest being closed by sutures. The glands are left for a subsequent operation. Finally, the large tracheotomy tube is removed and a smaller Hahns' cannula introduced.

Unless the tumor is in the larynx or posterior pharyngeal wall the epiglottis should be divided close to its thyroid attachments. When the lesion is situated in the base of the tongue the epiglottis need not be removed; it is better to dissect back that structure from the tongue and open the buccal cavity in front of it.

Macroglossia Neurofibromatosa. Although neurofibromatosis or plexiform fibroma of the nerve is in certain situations, relatively speaking, not uncommon, the tongue, which was so strikingly involved in the case reported by Abbott and Shattock,¹ is an exceptionally rare site. The clinical features of the case were these: a child aged four years, born of healthy parents, and the youngest of seven, three of whom died in infancy. The disease began when the child was about two months old, and subsequently involved the nerves of the side of the face and neck. As will be seen from the illustration, the involvement of the nerves in the tongue was universal, is not uniform in degree, as appears from the eminence on the posterior part of the organ. The enlargement of the papillæ, which was more conspicuous over these eminences, was due in part to the deformities of the nerves themselves, and in part to an increase in the general connective tissue, but in no instance do they present lymphangiectatic or hæmangiectatic spaces as in common forms of macroglossia. In macroglossia of lymph or blood vascular origin the condition extends beyond the limits of the tongue. Vesicles may be present on the mucous membrane of the mouth and lymphatic cysts in the submaxillary region and neck. Two operations were performed upon this case—one upon the tongue, and one upon the neck—and upon examination of the specimens removed the following nerves were believed to have been implicated: Of the motor nerves, the hypoglossal, facial, and motor branch of the third division of the fifth nerve. Of the sensory nerves, the glossopharyngeal, the lingual, and auriculotemporal branches of the third division of the fifth nerve,

¹ Annals of Surgery, March, 1903.

and the transverse cervical, suprasternal, and supraclavicular descending branches of the cervical plexus. The probability is that the other two divisions of the fifth nerve and a small occipital and great auricular branches of the cervical plexus were involved as well. As to the diagnosis, the case before operation was regarded as one of macroglossia of lymphatic origin. The smooth, solid thickening of the face and ear was explained as due to congenital blocking of the lymphatics of the neck, while the nodular and cord-like masses in this latter situation were thought to be malformations of the same system. The granular appearance of the tongue itself and the cord-like structures in the tongue and neck, taken with the entire absence of vesicles and no signs of dilated lymph or blood spaces, should have been sufficient to have enabled one to have recognized the true nature of the lesion.

Tuberculosis of the Tongue. The case of tuberculosis of the tongue reported by Zintmaster¹ presented the following features: When the patient presented himself for treatment he was eighty years of age, and the ulcer had appeared on the tip of the tongue three months before. It gradually increased in size, and eventually developed the appearance of a malignant ulcer. Another unusual feature manifested by this case was the fact that the patient was unusually robust and that there were no other evidences of tuberculosis. Tuberculosis of the tongue is almost always secondary to tuberculosis of the throat or lungs. Furthermore, it is quite unusual in tuberculosis of the tongue not to find involvement of the submaxillary lymphatic glands. In the case above reported there was no palpable enlargement of these glands.

Cleft Palate. In the Breslau Klinik Kassel² has operated upon 40 cases of congenital cleft palate; of these 12 were total and 28 partial, and of the latter 14 involved the soft and posterior portion of the hard palate, and 12 the soft palate. In all cases the operation was completed in one sitting, and whenever possible the operation was performed between the third and fourth years. Kassel differentiates between the operative and functional results. The latter depends, apart from the intelligence of the patient, upon three points: 1. Upon the mobility of the velum palati. This must not be too short and too tense. 2. Upon the condition of the posterior wall of the pharynx—an atrophy of this influences the prognosis unfavorably. 3. Upon the condition of the tongue—hypertrophy gives an unfavorable prognosis. As to the results of the operation, in 60 per cent. there was a complete cure without any perforation; 11, or 27 per cent., were almost closed; 4, or 10 per cent., were not closed. There were no fatalities. Speech,

¹ Annals of Surgery, January, 1903.

² Inaugural Dissertation, Breslau.

as determined by subsequent examination, was restored in 8, or 20 per cent. ; was almost normal in 8, or 20 per cent. ; was greatly improved in 10, or 26 per cent., and slightly improved in 9, or 25 per cent. In 4, or 10 per cent., there was no improvement.

Plastic Operation for Excision of Epithelioma of the Cheek.

After removal of the growth a large gap was left, and in order to repair the defect Peck¹ took a flap from the corresponding side of the neck, so that it formed a part of the left cheek and angle of the mouth. The interesting feature of this operation was that the flap was not everted, as is usually recommended in these plastic operations, but its inner surface, which formed a part of the oral cavity, was allowed to heal by granulation. The results of the operation were very satisfactory. There was very little shrinkage in the size of the flap, and the granulating surface was eventually covered by normal mucous membrane.

Nerve Areas and Carcinoma of the Face. With generous clinical illustrations, Cheate² discusses the possible relationship between carcinoma and nerves in trophic areas. There are two features of this question to which he alludes : First, that there is a proportion of cases which show marked relationship between the spread of the primary focus and the distribution of nerves and trophic areas. Arising out of this observation is the practical issue that the extent of these areas should be taken into consideration in marking out incisions when removal of cancer is contemplated. He does not wish to detract from the importance we now attach to the lymphatic pathways of distribution, but only desires to add another factor. Second, there is reason for thinking that the incidence of cancer within a nerve area is not a fortuitous circumstance, but that it may be due to the direct or indirect nervous influence over that area. Suggestive of the relation of cause and effect between nerve distribution and carcinoma, he produces illustrations of a number of cases of rodent ulcer and squamous epithelioma which seem to be limited in their growth to the distribution of certain nerves, more particularly sensory nerves, as the branches of the trigeminus and the spinal cervical nerves. Thus in some cases the lesion was confined to the areas supplied by the fifth nerve, and were sharply defined from those supplied by the cervical nerves. In other cases when the disease began at the meeting place of two or more peripheral nerve areas, the latter were involved before the disease spread to others. He noticed that the origin of these growths was very often situated at the point where the particular nerve became cutaneous. Thus the commonest site of incidence in rodent ulcer cor-

¹ *Annals of Surgery*, July, 1903.

² *British Medical Journal*, April 18, 1903.

responds to the point at which the infratrochlear nerve becomes cutaneous. The behavior of malignant growths on the tongue confirms this theory of the trophic origin of carcinoma. Thus it is well known how carcinoma beginning on one side of the tongue does not extend beyond the median line, and yet there are no mechanical or vascular reasons for the disease being arrested temporarily at this point. If we should recognize the trophic origin of these growths it would be necessary to modify the principle upon which incisions are to be made in the removal of these growths. Thus it would be quite irrational to make a V-shaped incision for the removal of an epithelioma of the lip. As to the second feature, namely, that a carcinoma originates in a given nerve and as a result of nervous inflammation of that area, he says: "Cancer belonging essentially to the period of bodily degeneration is a point which seems to me of some importance in considering the following facts: Lugaro has proved that peripheral irritation causes central changes of degeneration in the posterior root ganglia of the spinal nerves. In these the ganglia cells are seen swollen and rounded. The Nissl bodies break up; the nucleus is eccentric and often quite at the periphery. Apart from senile degeneration there is, then, the fact that peripheral irritation can induce visible changes in the ganglion controlling the irritated area. At the same time I fully realize the importance of recognizing that central nerve impulses may be abnormal, although nothing abnormal can be seen in the central nerve ganglia.

"Before I knew of Lugaro's experiments I examined the posterior ganglion of the fifth dorsal spinal nerve of the right side, which I took away from a woman for the relief of agonizing pain in an inoperable cancer in the right breast, and Dr. Purves Stewart, who kindly stained the ganglion for me, found the same changes as described by Lugaro occurring in some of the ganglion cells.

"I do not wish to infer that a degeneration of the ganglion preceded the carcinoma in this case, because I know not if this really occurred.

"At the same time I cannot help alluding to the clinical fact that irritation is a great precursor of cancer, and added to this it causes degeneration in the particular ganglia whose peripheral ramifications are irritated.

"Carcinoma often appears in tissues which are associated with disorders of growth, such as moles, and these moles are themselves associated with definite nerve areas and the incidence of cancer."

That lesions of the peripheral nerves can give rise to cutaneous lesions has been proven positively in the case of herpes zoster. It is quite within the range of possibility that certain lesions of the peripheral nerves or spinal ganglia may play a rôle in the etiology of carcinoma

in the precancerous condition. It is quite possible that the irritants which we know do play a part in the etiology, for example, of carcinoma of lips, may act indirectly by setting up a peripheral neuritis.

FACIAL PALSY.

The Treatment of Chronic Facial Palsy by Neural Anastomosis. Since their first experience in 1895, Ballance and Stewart¹ have operated upon six cases of chronic facial palsy. The facial was joined to the spinal accessory in all but one instance, in which for reasons given below the hypoglossal nerve was selected.

INDICATIONS. When should the operation be performed? In cases of long standing is it justifiable to undertake the operation? These are the questions which naturally suggest themselves. Generally speaking, the sooner the operation is done the better the prognosis. Therefore, when we believe without doubt the nerve to be destroyed, operation should be performed without delay. On the other hand, when there is some reasonable doubt as to the permanency and completeness of the lesion, delay is justifiable. If in these doubtful cases at the expiration of six months there is not the slightest signs of recovery, operate at once. The results of experimental investigation and clinical experience have been so reassuring that we need not have the slightest hesitation in recommending operation under these circumstances. Inasmuch as this method of treating facial paralysis has but recently been introduced to the medical profession many inquiries have been made as to whether it holds out any hope to those who have had this disturbing deformity for years—two, five, fifteen, twenty years or more. This question is not a difficult one to answer. The element of time is of comparatively little significance as far as the nerve itself is concerned. Ballance and Stewart have taught us that after division of a nerve the peripheral segment begins to undergo regeneration whether or not it be ununited to the central segment, and that as soon as union of these two segments is effected the transmission of impulses to the muscles supplies the stimulus necessary for the completion of the regenerative process. The keynote to the whole situation, therefore, is the condition of the muscles. If the facial muscles are completely atrophied and will no longer respond to galvanic stimulation the prospects of restoration of function are extremely doubtful. Up to the present time three years is the longest period at the expiration of which the function of the nerve has been restored. Knowing the important part which the condition of the muscles plays in the prognosis, we can readily appreciate the value

¹ British Medical Journal, May 2, 1903.

of persisting in the employment of such measures as will tend to preserve muscle tone. In all these cases in which postponement is justifiable operation may eventually be indicated.

TECHNIQUE. The method of procedure which they carried out in their present series of cases was as follows :

“ Having first assured ourselves by galvanic stimulation that muscle fibres still survived on the paralyzed side of the face, the facial nerve was exposed at its point of exit from the stylomastoid foramen. The nerve trunk was cut across as high up as possible, and a minute portion of the distal segment was reserved for microscopic examination. The spinal accessory nerve was then exposed, its sheath incised at a level convenient for union with the divided facial, and into it the distal segment of the facial nerve was fixed by means of fine silk sutures. After healing of the wound the muscles on the paralyzed side were assiduously stimulated by daily galvanism for months, until faradic excitability reappeared, when the faradism was substituted.”

The methods which have been employed by others differ somewhat. Faure preserved the branch of the spinal accessory supplying the sternocleidomastoid ; Kennedy established an anastomosis by grafting the facial laterally into the spinal accessory somewhat similarly to Ballance and Stewart's method ; Cushing severed the spinal accessory and made an end-to-end anastomosis. In defense of this intentional sacrifice of the spinal accessory Cushing says the shoulder-droop following paralysis of the muscles supplied by the accessory he regards as a relatively trifling disturbance in the hope of reclaiming the face, and inasmuch as for a while at least the movements of the shoulder cannot be disassociated from those of the face, it may be a better plan to paralyze the shoulder muscles.

I have¹ discussed the question of technique in the light of all the clinical evidence that has up to the present time appeared in literature. Of the matters which must be considered before the operation is undertaken the most important of all is the selection of a suitable nerve with which to complete the anastomosis. Naturally, it is at present inadvisable to consider a purely sensory nerve, as it has never yet been proven that a nerve whose function it is to transmit impulses from the periphery to the brain, which is the function of a sensory nerve, will reverse its function and transmit impulses in the opposite direction, viz., from the brain toward the periphery, as is the case with a motor nerve ; but this reversal of the normal mode of transmission of impulses may yet be proved to be possible. The facial nerve, being a motor nerve, one should select, therefore, as its anastomotic complement a

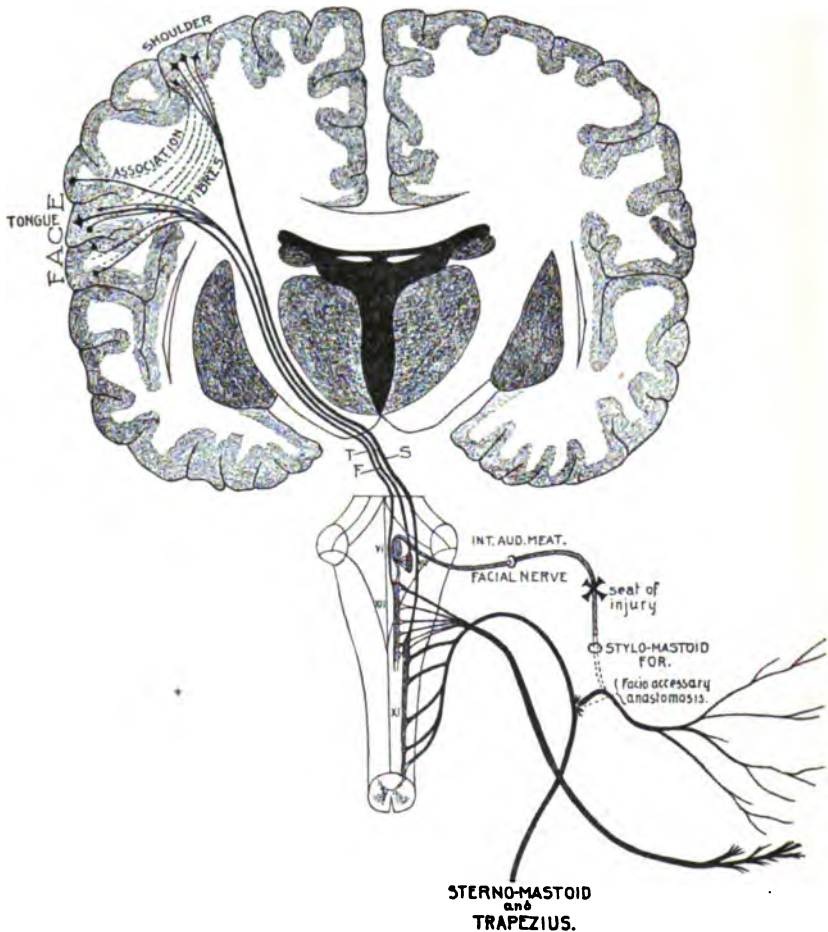
¹ University of Pennsylvania Medical Bulletin, November, 1903.

motor or a mixed nerve. Accordingly, three nerves have been proposed : the spinal accessory, the hypoglossal, and the glossopharyngeal, the last nerve not being very suitable. Assuming that from their anatomical relations either of the first two can be brought into apposition with the facial one as easily as the other, and assuming for the time being that in either case the nerve would be completely severed, which of the two—spinal accessory or the hypoglossal—is to be preferred? In order to answer this question we must consider for a few moments the results which have been recorded in cases upon which one or the other of these operations have been performed. Division of either will, of course, be followed by paralysis of the muscles which it supplies. In the case of the spinal accessory there will be complete paralysis of the sternocleidomastoid and partial paralysis of the trapezius and drooping of the shoulder. In the case of the hypoglossal there will be paralysis of the depressors and some of the elevators of the hyoid bone, with atrophy of one-half of the tongue. As compared with the deformity which it is hoped will be relieved either of these disturbances may be regarded as equally insignificant. From this standpoint, therefore, it matters little which nerve is sacrificed.

In order to find a practical solution of the problem we must study other postoperative phenomena. After the facial nerve has been anastomosed to the spinal accessory there follows an association of the movements of the face and shoulder—that is to say, whenever there is a voluntary or involuntary contraction of the muscles of the face there is simultaneously a contraction of the muscles of the shoulder, and *vice versa*. This phenomenon—not necessarily a permanent one, although no case has yet been reported in which the shoulder muscles could be innervated alone—is easily explained. The spinal accessory receives its impulse from a centre in the cortex of the brain that presides not over an individual muscle but over a group of muscles that control the movements of the shoulder; therefore, in order that the patient may bring into play the facial muscles after the facial nerve has been switched over to the spinal accessory, he must likewise bring into play the muscles of the shoulder; but in the course of time these once conjoint movements become, to a limited extent, disassociated—to the extent that the movements of the face may become independent. The patient may exercise control over certain groups of facial muscles independent of any associated movements of the shoulder. He may close the eyelid wholly or partially, may raise the eyebrow, pucker the lips, etc.; but so far as I have been able to discover in the records of cases hitherto reported, there has not been a single existence of a nerve anastomosis in which a voluntary effort to move the shoulder was not attended with contraction of the muscles supplied by the facial. These

so-called associated movements constitute, without doubt, a very serious objection to the selection of the spinal accessory nerve, and the criticism might be made and sustained that the condition of the patient has not been improved by the operation. A suggestion was made originally by Ballance and Stewart, approved by others, notably Bernhardt, and

FIG. 1.



Showing cortical origin of nerves supplying muscles to face, tongue, and shoulder. (From Ballance and Stewart's article on the Operative Treatment of Facial Palsy, *British Medical Journal*, May 2, 1903.)

in three instances put into effect (Ballance and Stewart, Körte, Frazier), viz., that the anastomosis be made with the hypoglossal. The reasons, therefore, are twofold: first, because the disagreeable complication of associated shoulder movements is avoided, and, secondly, because the cortical centre of the tongue is situated nearer the facial cortical centre

(Fig. 1). Whether it be true that disassociated movements of the face are matters of education of the newly established cortical centre (whether that of the shoulder or tongue), or that the impulses that precipitate these movements originate in the old facial centre or in the tongue centre, the hypoglossal nerve and cortical tongue centre should be chosen. If the first or "educational" theory be the correct one, the hypoglossal nerve is to be preferred, because the movements of the tongue are much more closely allied with those of the face than with those of the shoulder; and it is reasonable to infer that the newly-selected centre could for this reason be more easily and effectually educated to perform its new function; or if the second theory should be proven the correct one—viz., that the impulses must originate in the original facial centre—the tongue centre has the advantage over the shoulder centre in that the impulses would not have to travel as far from the tongue to the facial centre as from the shoulder to the tongue centre.

Spiller favors the selection of the hypoglossal nerve with which to make the anastomosis for the following reasons: "In selecting the hypoglossal nerve we select one whose cortical centre is functionally more allied to that of the facial than is the centre of the spinal accessory, or, let us say, more accurately, than is the centre for the lateral movement of the head or elevation of the shoulder, inasmuch as movements and not muscles are represented in the cerebral cortex. Even if associated movements persist in the tongue after division of the hypoglossal—and I cannot at present understand how they can do so if the motor supply of one side of the tongue is completely destroyed—these movements would be hidden from observation, and would not cause the annoyance to the patient produced by spasm of the face every time the shoulder or upper limb on the same side is raised, after the spinal accessory has been employed for the anastomosis. The turning of the head or raising the shoulder is only partly controlled by the spinal accessory, and we can readily understand why an overflow into the anastomosed facial nerve occurs if the movement in which the spinal accessory normally has an important part is produced. The cortical centre for the spinal accessory being only a part of the centre for turning the head or raising the shoulder, I doubt very much whether this centre can become so educated that it can assume perfectly the function normally exercised by the centre for the movements of the face.

"So long as a person laughs or cries with movement only in one side of the face, the restoration of function is not complete, although it may be very great as compared with the former condition. In employing the hypoglossal as the nerve for anastomosis with the facial, it is possible that emotional movements may be restored, and such seems to

have been the result in a case observed by Koster and Bernhardt,¹ in which the corner of the mouth on the affected side was moved during laughing."

Schaffer suggested that the glossopharyngeal nerve was still more suitable because its motor nucleus was much nearer and homologous with the facial nucleus. From the anatomical standpoint, its relative inaccessibility would make the operation extremely difficult.

Of less significance is the question as to whether the nerve should be completely severed and the movements of the muscles it supplied sacrificed, or whether only a portion of the nerve be used to complete the anastomosis. Both of these methods have been employed, but the former seems to me to be more rational, and for the following reasons: In the first place, the operation is easier of execution if one has the entire nerve trunk and not a portion or a branch of the nerve with which to make the anastomosis; secondly, because, if it is true, as is claimed by some, that the selected cortical centre must be educated to preside over the facial muscles, the unlearning of its original and the learning of its new function will be facilitated if its connection is completely severed from the peripheral muscle, which it supplied originally, and from its accustomed centripetal excitation (Rothmann).

As an additional argument in favor of end-to-end anastomosis, Spiller² says: "The chances of full restoration of power are greater after the former operation, because the whole restorative force of the central end of the completely divided nerve is directed into the peripheral end of the facial. No matter which view of regeneration we accept—whether we believe that the restoration is dependent upon the outgrowth of new axis-cylinders from the central stump, or that new axis-cylinders are formed in the peripheral stump—we must believe that the reunion of the divided ends of a nerve is necessary for complete regeneration. If, therefore, only a part of a healthy nerve is brought into contact with the peripheral stump of the divided facial, we cannot expect so satisfactory results as when the entire transverse surface of the healthy nerve is sutured to the end of the facial stump."

RESULTS. In Ballance and Stewart's cases there was more or less restoration of function to the paralyzed muscles, but the movements were always associated with movements of the shoulder. In none of the cases were the movements disassociated, and in not a single case was there restoration of the emotional expression, such as laughing, crying, etc.

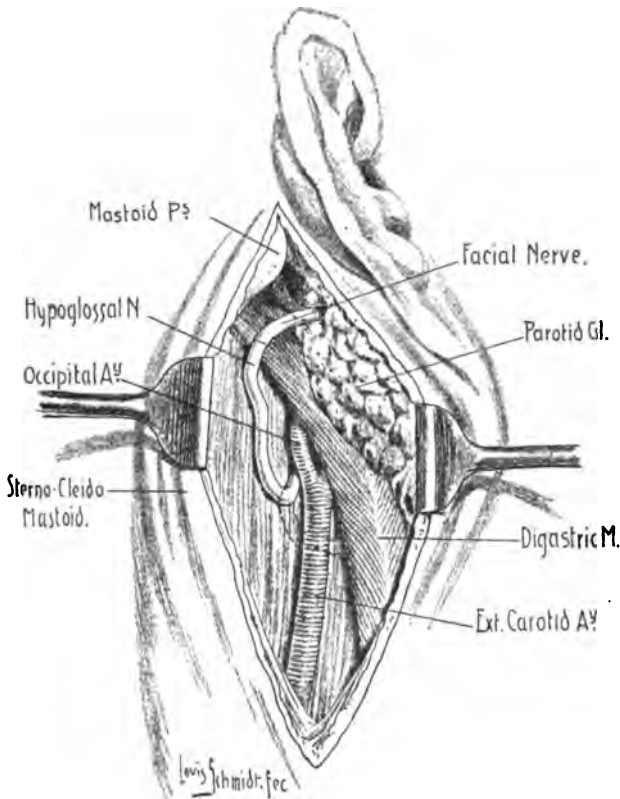
In Kennedy's case facial movements were restored, but none of these

¹ Berliner klin. Wochenschrift, 1903, No. 34, p. 788.

² University of Pennsylvania Medical Bulletin, November, 1903.

movements were disassociated. Körte's case, in which the anastomosis operation (faciohypoglossal) was performed at the conclusion of a mastoid operation, the patient had no associated movements, but recovered voluntary control of certain individual groups of muscles. In Cushing's case the operation (faciospinal accessory) was performed six weeks after the injury was sustained under the most favorable circum-

FIG. 2.



Frazier's operation for the faciohypoglossal anastomosis.

stances. The patient recovered volitional control of certain individual groups of muscles, and to a slight degree emotional expression was restored. In Frazier's case (Fig. 2) sufficient time has not elapsed since the operation for the process of regeneration to have been completed. At the expiration of three months the symmetry of the face had been partially restored, showing the restoration of the normal muscle tone.

In a case quite recently reported by Nicoll,¹ the facial and hypo-

¹ *Lancet*, October 3, 1903.

glossal nerves were anastomosed, but sufficient time has not elapsed for any improvement to have taken place. Nicoll says the patient suffered little inconvenience because one-half of the tongue was paralyzed, and suggests that it may be possible to graft the distal stump of the hypoglossal on the affected side to the intact hypoglossal in the opposite side.

From these brief statements of the results of the operative attempts, and from a glance at the table, one observes that there are three grades or degrees of improvement leading to complete recovery which may be anticipated. The first, which is the least that could be expected from the operation, is the restoration of the normal muscular tone; the muscles are no longer flaccid; the face in repose is symmetrical—not as before, asymmetrical. This of itself would be sufficient to warrant one's recommending the operation, that is to say, if no greater improvement were anticipated, the prospect of obliterating the deformity in moments of repose should settle any doubt in the patient's mind as to the advisability of undergoing the operation. Rothmann,¹ in a discussion before the Berlin Gessellschaft für Psychiatrie und Nervenheilkunde upon this subject, said that he thought it was quite doubtful whether it would be possible to restore the finer expressional movements, but that it was quite enough to claim for the operation that the disfigurement would be done away with. The second stage or grade of improvement, and one which has been obtained in a majority of the cases, is the voluntary control of the individual muscles, such as those concerned in raising the eyebrows, in closing the lids, or in puckering the lips, as in whistling. Such restoration of voluntary muscular control is a very material gain, for not only is the patient's face symmetrical in repose, but symmetrical in action. To be sure in most of these cases those movements were associated with movements of the shoulder, because the spinal accessory nerve was selected as the anastomotic complement. This might be considered a serious objection to this operation, for example, in one of the cases it is said that when the patient, a young woman, carried an umbrella, that every time she swung the arm holding the umbrella the facial muscles on the affected side twitched. When the hypoglossal nerve is selected there should be no associated movements, since the enervation of one-half of the tongue is entirely abolished. There is but one centre in the cortex presiding over the muscles of the tongue; but no centre in the cortex presiding over the muscles supplied by the spinal accessory alone; this centre presides over all muscles that have to do with all the movements of the shoulder.

The third or last grade, the attainment of which signifies complete

¹ Berliner klin. Wochenschrift, No. 34, 1903.

recovery, is the return of the expressional movements, as laughing, crying, etc. The mechanism of these movements is much more complicated, and is a matter of delicate co-ordination. This is the ideal result, but one which has not as yet been obtained.

THE JAWS.

Cicatricial Stenosis of the Jaws ; Ankylosis Spuria Mandibulæ.

Trismus may be due to a lesion of the temporomaxillary articulation or to the formation of rigid cicatricial bands and masses which hold the maxillæ in an unyielding grasp, reduce the capacity of the buccal space, and thus interfere with mastication. This condition is the result of destructive lesions, such as attend ulcerative and gangrenous processes, more particularly when they involve the mucosa. Most of them, as noma, diphtheria, syphilis, cancrum oris, and scarlatina, occur in early life, and seriously interfere with the development of the lower jaw. The jaw is infantile in size, asymmetrical, the eruption of the permanent teeth is interfered with, the entire muscular apparatus of mastication undergoes atrophic changes from arrested development and disease, these cicatricial masses undergo a process of ossification ; the final result is one of great disfigurement and distressing interference with function. Matas¹ reviews the operative procedures that have been recommended, and recounts the history of a case in which he was able by perseverance and ingenuity to obtain an excellent result. All of the procedures which have been applied to the correction of this deformity he groups under the following heads :

1. Division and excision of the scar tissue, with substitution of transplanted skin or of mucous flaps, for the lost mucosa.
2. Division and detachment of tendinous insertions and aponeurotic expansions of the muscles of mastication at their surface of attachment to the lower jaw (masseter, pterygoid, etc.) after division of the cicatricial bands in the mouth.
3. Creation of a new point or centre of motion in the body of the jaw (pseudoarthrosis) by osteotomy in front of the resisting and unyielding scar masses when these exist in the post-buccal space.
4. Excision of the temporomaxillary joint, condyle or part of the lower jaw, with or without associate myoplasty. This method, which Matas finally worked out in his own case, was a combination of the Jäsche, Gussenbauer, and Esmarch operations. Ankylosis was due to several attacks of mercurial stomatitis, the first and most severe of which occurred when the patient was but seven years old—twenty years before the operation. The operative treatment covered a period

¹ Journal of the American Medical Association, November 23, 1903.

of two years, and included six operations. The first operation was carried out according to the Jäsche plan ; the formation of an artificial oral cleft by making a through-and-through section of each cheek, including the cicatricial and ossified bands, and by separating the jaws and suturing the skin of the cheeks to the gums ; the second operation, about nine months later, was in effect the second stage or completion of the Jäsche method ; two simultaneous flaps were cut from the upper and lower margins of the buccal cleft, each flap extending at its thickest or detached portion from the angle of the mouth to the end of the newly-formed cheek gap ; these flaps were turned into the mouth so that the epidermal surface faced the interior of the mouth, or raw surface, looking outward. The free margin was sutured in place with chroma-cized catgut, and the external incision in the cheek was closed by a series of interrupted catgut sutures. The wound on the right side healed throughout by first intention, but the flaps on the left side sloughed away in consequence, no doubt, of defective vascular supply.

As a result of these two operations the patient was able to separate his jaws only half an inch ; limitation of motion seemed to be due to the cicatricial contraction of the left cheek, which had returned nearly to its original condition. Before resorting to any further plastic work, excision of the right condyle of the lower jaw and a part of the ascending ramus, leaving the coronoid attachment of the temporal muscle, was practised with a view toward increasing the general mobility. This seemed to have little benefit. Fearing that after a second plastic operation secondary contraction would take place, Matas decided to create a pseudoarthrosis after Esmarch by making a cuneiform excision of the left angle of the lower jaw. This, the fourth operation, was combined with the first stage of Gussenbauer's method, in which a skin-flap from the neck is turned into the oral cleft, so that the skin edge is sutured to the inner raw surface of the cleft corresponding to the upper lip ; the raw surface of the flap is also allowed to contract adhesions with the gum and cheek of the upper side of the cleft in order to obtain a better vascular supply. No attempt was made at the operation to close the gap in the mouth by suturing the free edges of the flap to the lower of the cleft, for fear that the flap might undergo necrosis. Six months were allowed to elapse before undertaking the final closure of the gap. The transplanted flaps were partially detached from the upper edge of the cheek cleft, leaving the gum base attached. The dermal surface faced the mouth ; the lower edge of the raw surface was brought into apposition with the lower edge of the cleft by a series of mattress sutures. This constituted the sixth and last operation. The final results were satisfactory. When the patient was

admitted to the hospital it was just possible to introduce the blade of a penknife flatwise between the incisor teeth. On his discharge the patient could separate the front teeth more than an inch, move the jaws laterally quite freely, and chew any article of diet without difficulty.

Actinomycosis (Central) of the Inferior Maxilla. Actinomycosis as a primary affection of the skeleton is, indeed, rare. Since in most instances infection takes place through the skin or mucous membrane, the primary lesion is found in the soft parts, and the bones become involved by extension of the process. The latter inclines to extend along the course of the bones, more especially the jaws, the base of the skull, the vertebræ, the ribs, and the sternum, but the infection is periosteal and not endosteal. If in these cases the bone becomes involved the lesion is a superficial one, as a rule a periostitis, although occasionally an osteitis may develop. Central actinomycosis of the jaw, on the other hand, is a very rare affection, and presents some features of interest, one of which is the mode of infection. It is more than likely that the infectious material reaches the bone through a carious tooth; in fact, Partsch prepared some sections of teeth in which he demonstrated the presence of actinomycotic lesions at the roots. Central actinomycosis occurs as a central caries, in which the medullary spaces are filled with the typical granulation material, or as a tumor—actinomycoma. The tumor appears at the angle of the jaw, without involving the soft parts, and consists of a bony capsule inclosing one or more cystic spaces filled with actinomycotic granulation tissue. The case which came under the author's care was diagnosed as sarcoma. A portion of the angle of the jaw was resected without destroying its continuity. A microscopic examination revealed the true nature of the lesion.

Cysts of the Lower Jaw. These have usually been classified under three main heads: First, the true dentigerous or tooth-bearing cyst; second, the diminutive but allied form, so-called dental cyst; and third, the multilocular cysts. The report of a case illustrating the last of this group has been contributed by Keenan.¹ The child is now thirteen years of age, but a small lump had been observed by the parents when the child was but two years old. Multilocular cysts of the jaw have been known also as adenosarcoma and cystic sarcoma. They may appear at any age, and may or may not be the result of delayed or incomplete dentition. Microscopically, they consist of a number of small cysts containing a yellow colloid material verging upon the red. The wall of these cysts is composed of a fibrous or bony tissue lined with large columnar cells. These cysts are frequently

¹ Montreal Medical Journal, June, 1903.

mistaken for myeloid sarcoma. In a certain number of cases recurrence takes place either locally or in the cervical lymph glands.¹

Central Fibroma of the Inferior Maxilla. Of the forty cases of fibroma of the lower jaw but eleven were, strictly speaking, of central origin, and three of these were observed in the Tübingen Klinik. Blauel,² in an analysis of these cases, collected the following data: But little is known of the etiology, although in all probability they have their origin in a retained tooth, and are situated usually in the central section of the horizontal ramus of the bone. As the tumor grows the outer shell or compact bone remains intact, although sometimes this is penetrated, especially in the direction of the alveolus. The growth of fibromata, here as elsewhere, is essentially slow, and though bearing the characteristics of a benign growth they may attain to a considerable size. Occasionally and unquestionably, as in the case reported by Blauel, they undergo malignant metamorphosis and become converted into sarcomata. On this account the prognosis must be guarded. The treatment is operative; in some cases a mere extirpation of the growth will suffice; in others partial or total resection of the ramus will be required.

Resection of the Lower Jaw. During the past few years a very important contribution has been made to the technique of resection of the lower jaw by the introduction of temporary and permanent prosthetic appliances. Every surgeon is familiar with the horrible disfigurement that aforesaid was an unavoidable result. Tillman³ employed in several cases a piece of sheet aluminum. A model of the jaw is made of the material, and when a part of the jaw is resected the corresponding part of the model is cut out and inserted in place of the portion of bone excised. This temporary prosthetic appliance prevents the tissue from retracting as the wound heals. Subsequently a permanent hard rubber prosthetic may be substituted.

Giant-celled Sarcoma of the Lower Jaw. Archibald⁴ reports a resection of a portion of the lower jaw for giant-celled sarcoma and the introduction of an improvised silver wire splint for the prevention of subsequent deformity. He calls attention to the propriety of conservatism in the operative treatment of myeloid sarcomata, and describes the various prosthetic appliances that have been used both in this country and abroad after resection of the lower jaw.

SARCOMA OF THE LOWER JAW. Lund⁵ performed a subperiosteal resection of the lower jaw from the canine tooth in front to a point in

¹ Chadwick's article, *Annals of Surgery*, January, 1903.

² *Beiträge zur klin. Chirurgie*, Bd. xxxvii.

³ *Deutsche med. Wochenschrift*, Bd. xxix. No. 23.

⁴ *Montreal Medical Journal*, July, 1903, p. 492.

⁵ *Boston Medical and Surgical Journal*, December 3, 1903.

the ramus of the jaw level with the alveolar process. The growth was a giant-celled sarcoma. The periosteum evidently replaced the lost bone to a considerable extent, as a firm bony bar could be felt in the place of the section of bone removed. The resulting deformity was very slight, and illustrates the satisfactory results that may be obtained from a subperiosteal resection.

Excision of Superior Maxilla under Medullary Narcosis. Morton has had what I believe must be a unique experience with *spinal cocainization*. He has used this form of analgesia in 929 cases, 76 for operation above the diaphragm, such as amputation of the tongue and excision of the jaw. He reports¹ a case in which he excised the superior maxilla. The technique which he employed in this case consisted in placing within the syringe one-half grain of sterile cocaine. When the needle was introduced into the subarachnoid space between the third and fourth lumbar vertebræ the syringe was attached. As the piston was withdrawn enough cerebrospinal fluid was allowed to enter the syringe until it was two-thirds full. After the cocaine was dissolved the solution was introduced as rapidly as the piston could be pressed. Analgesia was complete in twenty minutes. During the operation the pulse varied from 90 to 100, respiration remained normal, and the patient was not nauseated. In operations upon the buccal cavities the method offers many advantages. 1. The anæsthetizer is not in the way of the operator. 2. The danger of blood and secretions entering the lungs and producing suffocation or, later, pulmonary complications is absent. 3. It can be used in acute disease of the heart, lungs, or in the kidney complications when a general anæsthetic is contraindicated. 4. The shock of the operation is diminished, and there is not the severe disturbances which often follow a general anæsthetic.

There is no question but that this method possesses certain advantages in operations in locations where there is danger of blood and secretions entering the lungs. Be that as it may, however, this whole question of spinal cocainization is still *sub judice*, and whatever may be the reason it is not employed as often to-day as it was two years ago. A certain number of deaths have been reported, and a number in which the toxic effects of the drug have given cause for alarm, whether these were due to faulty technique or to the selection of too large a quantity has not been determined. The technique which Morton recommends is an excellent one, in that it avoids the possibility of infection and of any disturbance that might follow any addition to the quantity of fluid in the subarachnoid space. There are certain cases in which this means

¹ American Medicine, March 21, 1903.

of inducing anæsthesia would seem to possess certain advantages, as, for example, where there were any positive counterindications to the administration of ether or chloroform. In the case of operation upon the buccal cavity I should prefer to carry out the suggestion of Crile's, of administering the anæsthesia through a tube introduced through the nose into the pharynx. By this method the pharynx can be so walled off that blood and secretions cannot gain access to the respiratory tract. This together with temporary closure of one carotid renders the operation free from difficulties and from the possibility of septic pneumonia.

THE NOSE.

Fracture of the Nose. Grant¹ has devised a bridge for nasal fractures and deformities which he believes is superior to the use of plugs of cork, metal, rubber or any other material, both as to cleanliness and preventing deformity. The difficulty of keeping the nose clean, upon which depends the success of the treatment, is the principal objection to the use of the plug. The instrument is composed of two cheek-plates of hard rubber, not exceeding one-eighth inch in thickness, and should be one and one-half inches in greatest diameters, cheek surface slightly concave, two upright steel bars one and one-half inches long, one-third inch wide, a connecting bar three-fourths inch long, and a double tape twelve inches long to fit in the slot of the rubber plates.

In acute cases the instrument is applied as follows: Take a needle, preferably a straight one, with a stout silver wire, insert the needle from the outside of nose, close to the septum, at or near the point of depression, enter the cavity and push the needle out of the anterior nares. Now thread with a curved needle, re-enter the nostril, same side, and carry the needle through the skin from within out close to the septum, and directly opposite the primary entrance. The septum is now embraced in a loop. The bridge is now applied by straddling the nose and tying the double tape (all in one knot), moderately tight, back of the head, one piece being placed above and one below each ear. The ends of the wire are now carried through the little holes in the transverse bar of the instrument, the septum pulled upward to a satisfactory position, and the wire twisted around the bar. In chronic cases it will be necessary to free and straighten the septum before the wire loop is introduced.

¹ *Annals of Surgery*, September, 1903.

THE NECK.

Provisional Hæmostasis in Operations upon the Head and Neck.

In discussing the methods of securing provisional or prophylactic hæmostasis for operations upon the head and neck, Fowler¹ dwells especially upon the Dawbarn method of closing both external carotids and Crile's temporary closure of the common carotid arteries. As to the practice of the former, Fowler believes it is not likely to be employed as precedent to radical operative interference save under the most exceptional circumstances. Although the operation was designed by Dawbarn to starve out inoperable growths it may be practised even in cases in which subsequent improvement, both local and general, may render it possible to perform a radical operation. Fowler applied this method to a case of extensive carcinoma of the cheek, in which at first sight he despaired of being able to accomplish much for the patient's relief. The condition improved so after ligation of the external carotid that in the course of a few weeks it was possible to remove all the malignant tissue, including the superior maxilla, and the operation was almost bloodless. Referring to the method of temporarily closing the common carotids, Fowler speaks (1) of the possible dangers, such as may arise from the deprivation of important organs of their normal blood supply; (2) as to the possibilities of the formation of coagulæ, and the subsequent passage of these into the blood stream, and (3) as to the injurious effects of the pressure upon the arterial coats. The surgeon should consider seriously these possible complications before undertaking the operation. As to the first of these considerations, as far as our present knowledge goes, the effect of the diminished blood supply is practically *nil*. As to the second, it has been shown by Alexander Schmidt that one of the factors essential for blood coagulation is an injury to the cells of the intima. If the Crile clamp is used the necessary compression may be secured without endangering the integrity of the intima. Thirdly, permanent injury of the vessel wall will not occur if the proper instrument is used for the purpose of occluding the artery. While theoretically, at least, the objection to this method may be explained away, in actual practice a case occurred in Fowler's practice in which the patient developed sensory aphasia. The operation was an intracranial neurectomy of the peripheral branches of the Gasserian ganglion; whether the complication was due to a dislodged thrombus, or whether it was due to an injury upon the brain inflicted by the elevator in lifting the brain, is not entirely clear. As the patient's vessels were markedly atheromatous it is more than likely

¹ Buffalo Medical Journal, June, 1903.

that the circulatory disturbance was due to a dislodged thrombus. At all events, Fowler does not feel that he should be deterred by this occurrence from employing the method in future cases, but is quite convinced that too much stress cannot be laid upon the importance of exercising care to avoid injuring the vessel. I have already expressed my views upon this procedure in discussing the methods of controlling hemorrhage in cranial operations. The method is not as efficacious as it would appear at first sight, because it does not control venous hemorrhage, and in certain operations, as, for example, those upon the Gasserian ganglion, much of the hemorrhage is from this source. And owing to the possibility of cerebral embolism the method cannot be said to be free from danger. Temporary closure should not be employed as a routine measure, but should be reserved for desperate cases, and then applied only to one and not to both arteries.

The Resection of Large Nerve Trunks in the Cervical Region.

During operations for the removal of malignant growths of the neck the question often arises whether the tumor can be removed without sacrificing the large vascular channels and nerve trunks. The common carotid and internal jugular vein have been ligated frequently without any untoward effect, more especially if the tumor has been compressing the vessel for a long time. If the case is not too far advanced it may be necessary to remove the vein only. Curiously enough the sheath of the vein always becomes infiltrated before that of the artery, whether the tumor be of an inflammatory nature or a neoplasm. In advanced cases the growth involves not only the vessels but the nerve trunks, and frequently surgeons have stopped short of removing the entire growth, because it involved removal of the pneumogastric nerve. As a matter of fact, the majority may be resected without any risk to life, although the operation may be followed by functional disturbances. Feodoroff¹ has looked over the literature of the past ten or twelve years and has been unable to find a single case in which death followed resection of the vagus. In some cases the respiratory or cardiac functions were interrupted temporarily during the operation, and in some vagus pneumonia developed. He has seen four cases in which important nerves were purposely severed during the operation; one in which a portion of the vagus was removed without complete recovery; in another the tenth, eleventh, and twelfth cranial nerves and all the branches of the cervical plexus were removed. Apart from the muscular paralysis, hoarseness and regurgitation of food, immobility of the epiglottis and anæsthesia of the epiglottis followed the operation. Feodoroff calls attention to the fact that it

¹ *Russky Vratsch*, February 8, 1903.

is not the resection of but irritation of the vagus that is attended with danger. Irritation of the nerve is attended with slowing and, perhaps, arrest of the heart action ; while section of the nerve may or may not produce acceleration of the pulse. The author recently operated upon a case of extensive infiltration of the tissues of the neck, with a recurrent sarcoma. In order to thoroughly excise the growth it was necessary to remove the common carotid, internal jugular, the vagus, the descendens noni, the spinal accessory, and hypoglossal. Neither during nor subsequent to the operation did the patient manifest signs of interference with nerve supply of the heart. The patient was out of bed within a week, and returned to business a few days later. In a third case of the series the tumor—a sarcoma—involved nearly all the tissues of the neck on the affected side ; the patient made an excellent recovery, and remained free from recurrence for a year. If there is a lesson to be learned from Feodoroff's experience and that of others it is, that if an operation is undertaken for the removal of a malignant tumor no structures of the neck should be spared, however necessary for the preservation of life they may seem to be from a theoretical point of view.

Irritation of the Vagus by a Silk Ligature. In connection with the preceding, I may refer to a peculiar experience which Powers reported at the meeting of the American Surgical Association. The patient had undergone an operation for the removal of a large mass of cervical glands, during which hemorrhage was said to have been so profuse that the patient went into collapse on the table. Immediately after the operation there were severe, continued, spasmodic coughing, great distress, and complete loss of voice, the latter continuing for two or three weeks. The former gradually subsided, but any pressure in the region of the wound excited severe coughing. This condition persisted for a year. During this time several silk ligatures had been discharged from the wound, and finally the end of another ligature presented at the upper end of the sinus. The traction that was made upon the ligature in the endeavor to remove it occasioned intense coughing, pain, shortness of breath, and vomiting ; although operative interference had been considered at a previous date, it was deferred for fear of the serious respiratory embarrassment that might come on under the anæsthetic. Believing the symptoms were due to irritation of the pneumogastric by the silk ligature, Powers decided finally to undertake the operation. As ether excited such violent coughing, chloroform was substituted ; the ligature was exposed lying in a large mass of granulation tissue, and with extreme care the ligature, the circumference of

¹ Medical News, October 3, 1903.

which was the size of a lead-pencil, was cut and withdrawn. Two months after the operation the wound had healed entirely, and the signs of vagus irritation disappeared. While the operator was unable anatomically to recognize the pneumogastric nerve in the wound, he had no doubt but that the ligature had encircled it.

Salivary Calculus. Based upon the symptomatology four types of salivary calculi may be recognized. Cather Conthon¹ describes these as follows: 1. Ordinary type, in which the calculus slowly increases in size without the intervention of inflammatory phenomenon, causes a source of discomfort at meal-times, and during mastication is associated with a well-defined pain, of the nature of a salivary colic, lasting from fifteen to twenty minutes. This condition continues for months or years, when perforation occurs, and the calculus is discharged into the mouth. 2. The latent type, in which, prior to the discharge of the calculus into the mouth, there are no subjective or objective symptoms. 3. The inflammatory type, in which at first signs of inflammation appear in the buccal mucosa associated with difficulty of deglutition and spasmodic closure of the jaw. This condition is mistaken often for a simple stomatitis, and the true condition not recognized until the stone ulcerates through into the mouth. 4. The pseudoneoplastic type, in which the organization of inflammatory tissue around the duct gives rise to an indurated area which has been mistaken for a malignant growth.

Aerogenes Capsulatus Infection of the Neck. The following are the clinical features of a case reported by Leroy:² There was a history of sore throat, with considerable swelling of the neck in the region of the tonsil resembling an extensive suppurative cellulitis. A free incision gave vent to a small amount of dark fluid, but no pus, and frequent irrigation of the wound had no effect. Finally, the skin and cellular tissues became necrotic, and on the fifth day sloughed away, leaving the underlying tissues exposed to view. In addition to the ordinary signs of a virulent infection, the urine showed a progressive diminution in quality, specific gravity, and total solids. An examination of the blood showed a progressive decrease in the number of erythrocytes and percentage of hæmoglobin; the leukocytes gradually increased to 72,000 until twelve hours before death, when an enormous drop apparently heralded the end of the patient's ability to react. The bacteriological examination of the pus, taken from the wound six days before death, proved the infection to be due to the bacillus *aërogenes capsulatus*.

¹ Gazette des hôpitaux, 1903, vol. lxxvi., No. 27.

² Journal of the American Medical Association, October 24, 1903.

Caput Obstipum. Simple division of or extirpation of the *contracted sternocleidomastoid*, according to Wallstein,¹ is not sufficient to effect a cure when the opposite muscle is 4 cm. longer than its fellow, because under such circumstances it cannot perform its function. In these cases the overstretched muscle should be shortened by operation and retained by apparatus in a position of overcorrection until its normal length has been restored. In this condition the muscle will be able to contract sufficiently to correct the malposition of the head. The muscle should be shortened from 4 cm. to 8 cm., according to the difference between the length of the two muscles. In order to avoid injuring the nerve supply the operation must be performed below the point at which the spinal accessory enters the muscle. Some method must be devised which will not, in spite of the shortening, interfere with the functional activity of any portion of it. A simple resection is contraindicated, because the lower portion of the muscle would lose its innervation; and in order to prevent this Wallstein suggests a plan whereby the desired shortening is obtained by taking a pleat in the muscle and securing the overlapping portion in place by means of sutures introduced beneath the entrance of the spinal accessory nerve. The dressing is applied with the deformity overcorrected, and the bandage is not removed for twenty days.

Tumors of the Intercarotid Body. In the cellular tissue on the posterior border of the fork of the common carotid lies the so-called intercarotid body. It develops from an outgrowth of the adventitia of the carotid, and is composed of from four to twelve lobules, which are partitioned off from one another by septa given off from a compact fibrous capsule. The latter consists of partly fibrillated, partly homogeneous connective tissue, contains much elastic tissue and groups of fat-cells, and passes over into the connection between the internal and external carotid. In the six cases of tumor of the intercarotid body which Scudder² found recorded in literature, the tumor was situated at the fork of the common carotid artery, and had so developed that neither the internal nor external carotid artery could be separated from it. The tumor was encapsulated, adherent to the vessels, but not to the surrounding tissue. Usually they grow to the size of a hen's egg, but may grow much larger and become so destructive as to endanger the wall of the vessels. Recurrence occurred in one instance. The differential diagnosis must be made from an ordinary lymphoma and an aneurysm. As to the pathology of these tumors, Marchand declined to give a name to the tumor which he examined, because he knew of none which

¹ Centralblatt f. Chirurgie, 1903, No. 33.

² American Journal of the Medical Sciences, September, 1903.

would exactly fit. In view of its structure and etiology, he thought one would be most justified in calling it an alveolar angiosarcoma. The microscopic examination made of the tumor removed by Scudder showed the growth to be traversed by arteries between which lay the tumor tissue proper. This was composed of large, round, and spindle cells, with but little intercellular substance, and traversed by blood channels lined with a single layer of endothelial cells. Scudder's patient was a woman between twenty and thirty years of age; the tumor, which was present for over nine years, was firm, non-fluctuating, non-tender, and about the size of a pigeon's egg. In all cases the operation involves ligation of the common carotid artery below and its division above the tumor mass, because the tumor is so intimately connected with the vessels. As the growth is not adherent to the surrounding tissue, its extirpation is not attended with any difficulty.

According to Reclus and Chevassu¹ some eleven cases of inter-carotid body, not including Scudder's, have been reported. The only growths which could be confounded with it are aberrant thyroids and mixed branchiomata. The characteristic clinical signs of this tumor are a soft and compressible swelling of the size of a small hen's egg, moving freely with pulsations of the arteries, but without expansible impulse or bruit; the tumor is situated always above the superior margin of the thyroid cartilage and below the parotid gland; its growth is peculiar, at first very slow, afterward characterized by repeated stages of rapid development. According to Reclus, the results of the operative treatment of these growths have not been such as to warrant one recommending operation without qualifications. In two out of ten cases death was directly due to the operation, one from hemorrhage, and one from bronchopneumonia, ascribed to section of the vagus. In six cases which recovered various disturbances arose—in one a hemiplegia and aphasia followed ligation of the common carotid, and in the remaining five there were other disturbances arising from injury to the laryngeal and facial nerves. On account of the adherence of the growth, not only to the carotid vessels but to the internal jugular vein, the pneumogastric and sympathetic nerves, very extensive resections must be made in order to remove the growth. On account of the serious complications that have arisen from the extensive resection of these structures, and in view of the fact that these growths are probably not malignant, Reclus advises the surgeon to abstain from operations, unless the tumor gives rise to some severe functional disturbances.

Mucoid Cysts of the Neck. Mucoid cysts of the neck arising from the thyroglossal duct are recognized by their position in the median

¹ *Revue de chirurgie*, vol. xxiii., No. 8.

line and by the character of the epithelium (cylindrical and ciliated) lining the walls. To the forty-nine cases which have hitherto been collected Fredet and Chevasse¹ add two more. That they came from the remains of the thyroglossal duct was proven by their anatomical relations and microscopic findings. The layer of lymphoid tissue beneath the epithelium, which was noted in both cases, is found not infrequently in congenital formations. By some observers, notably Koenig and Jeanbreaux, the presence of this layer of lymphoid tissue is supposed to be diagnostic of branchial fistula, but Chevasse and Fredet do not believe it to have this limited significance.

Thyroid Gland. EXOPHTHALMIC GOITRE. Whether because of the helplessness of the physician in his efforts to cure the condition, or because of the aggressive spirit of the intrepid surgeon, the treatment of exophthalmic goitre is passing gradually into the domain of surgery. There have been of late no contributions to the pathogenesis of Graves' disease which have thrown any new light upon the perplexing question, and until some definite conclusions are reached there will always be some uncertainty and dispute as to the most rational method of treatment.

It is to be hoped that further histological study of the gland, and the investigation of the physiological action of its secretion in states of health and disease, will enable us eventually to state specifically the origin and nature of this complex clinical picture. We may assume without argument that the surgical therapy for Basedow's disease is perfectly legitimate, and it remains for us, as surgeons, to determine by clinical observations and by a comparison of results which operation is the most rational.

Perhaps, in a way, it may be said to be true of no one else; but surgeons throughout the world, with a few exceptions, are wont to look to Kocher as the court of last appeal in matters pertaining to the surgery of the thyroid gland. And so, when it comes to the question of operating for the relief of exophthalmic goitre, we appeal to Kocher for a decision, and we find that he insists *that all cases of Basedow's disease, and particularly those in the incipient stage, should submit to operation.*

There may be said to be but three operations which have stood the test of time—viz., ligation of the linguæ, partial thyroidectomy, and sympathectomy. The first two operations are advocated by Kocher, the last by the pupils of Jaboulay and Jonnesco.

TECHNIQUE OF THYROIDECTOMY. The operation itself involves no especial technical difficulties. The one factor which more than all

¹ *Revue de chirurgie*, February, 1903.

others has helped to reduce the mortality is the substitution of local for general anæsthesia. There is no question that the administration of a general anæsthetic is more or less responsible for a large proportion of the immediately fatal cases, and for that reason these operations should be performed under local anæsthesia. In the past anæsthesia has been induced by the Schleich method, but quite recently Huntingdon¹ has suggested the employment of regionary anæsthesia (cocainization of the nerve trunk), either independently or supplemented by Schleich's fluid. In the average case he believes we can rely upon regionary anæsthesia alone. He reports four thyroidectomies for the relief of Basedow's disease; in three of them he employed regionary anæsthesia, twice supplemented with infiltration anæsthesia, and once with a small amount of chloroform. The nerve which supplies the field of operation is the superficial cervical (*nervus cutaneus colli*). "To expose the nerve an incision should be made along the posterior border of the sternocleidomastoid about the level of the thyroid cartilage. (At this point the nerve passes around the posterior border of the sternocleidomastoid muscle and runs forward to supply the skin of the anterior triangle of the neck.) This may be done under cocaine anæsthesia. The area of anæsthesia, according to the anatomical distribution obtained, will be triangular, with its apex at this point and its base at the median line. The latter would practically extend from the suprasternal notch to the border of the mandible." After exposure of the nerve cocainization can be readily effected by the introduction within its sheath of two, or at the outside three, minims of a 2 per cent. solution of cocaine through a very delicate hypodermic needle. The duration of anæsthesia is fully one hour.

COMPLICATIONS OF OPERATIONS UPON THE THYROID. The dangers attending operation for goitre may be said to be immediate, consecutive, or late. The immediate dangers, or those which may happen during an operation, are hemorrhage and fatal syncope. It is generally conceded that the use of a general anæsthetic is responsible for the greater number of these. The consecutive danger, or that immediately following the operation, is *acute thyroidism*, and the subsequent danger *cachexia struma priva*. Curtis,² in connection with a report of a number of operations, discusses the possible causes of acute thyroidism as a complication of operative intervention and the prophylactic measures that may suggest themselves. The symptoms of the condition are more or less an exaggeration of the symptoms of Basedow's disease—tachycardia, fever, rapid and superficial respiration, twitchings, and restlessness. Death may be due to gradual exhaustion or œdema of

¹ *Annals of Surgery*, January, 1903.

² *Ibid.*, August, 1903.

the lungs. Morphine will quiet the restlessness, but no drug will control the heart ; the ordinary cardiac stimulants are useless.

In his series of eleven cases there were five deaths, all due to acute thyroidism. A careful study of each failed to throw much light upon the cause of the catastrophe, or disclose signs which might warn the operator that operation would be dangerous in any case. A comparison of the symptoms in those cases which recovered and those which terminated fatally showed that there was no essential difference between the two classes. The only possible sign of warning which he was able to discover lay in the condition of the kidneys. In all five fatal cases albumin and granular casts were found in the urine after operation. On the other hand, the same condition existed in four cases which recovered ; but all of these had a marked reaction in temperature and other symptoms after the operation. Curtis concludes from these observations that the presence of even a trace of albumin is a sign of warning that there may be especial danger of thyroid poisoning in operating under such conditions. To account for the symptoms of acute thyroidism three theories have been advanced : (1) nervous influence ; (2) absorption of toxic thyroid material ; and (3) the absorption of toxic blood. The most popular theory is the second, and to avoid, as far as possible, the absorption of this material certain precautionary measures have been adopted. When we find that acute thyroidism is as common after sympathectomy as after thyroidectomy, this theory must be regarded, at least, as purely hypothetical. Turning to Kocher's experience we note that in twenty ligations of the thyroid arteries there were seven cases of thyroidism and one fatal case ; in thirty-eight partial thyroidectomies there were nine cases, with one death (embolism). Thus the complication developed with equal frequency after either operation. However, in fourteen bilateral sympathectomies by Jonnesco there were three cases of thyroidism, but all terminated in recovery. It is quite possible that some of the fatal cases might be attributed to the nervous shock of the operation. The attacks seen in subjects of Basedow's disease, under the influence of nervous excitement, is in favor of this theory.

The part that general narcosis plays in the results of operative interference is not uniform ; thus Jonnesco used chloroform in all of his sympathectomy operations, and yet every one of his cases recovered. Kocher, on the other hand, is convinced from his own experience that the dangers are less under local anæsthesia. He met with the severest reactions after those operations which were performed under ether narcosis, and in two of his three fatal cases he employed ether as the anæsthetic.

Taking all these facts into consideration, we must conclude that

none of the theories which have been advanced to explain thyroidism can be sustained by clinical results, or by the perfection of the technique of the operation. It is as common after one operation as another, and is not affected by any modification of the technique unless, as Kocher believes, by the use of local instead of general anæsthesia.

RESULTS OF THE SURGICAL TREATMENT OF BASEDOW'S DISEASE.

1. *Of thyroidectomy.* The most important as well as the largest series of operations performed by any one surgeon was referred to in the section on the Thyroid Gland one year ago.¹ Kocher operated upon 59 cases, 76.7 per cent. of which were cured, 14 per cent. markedly improved, and 4 cases, or 6.7 per cent., died. In these cases Kocher practised ligation of the thyroid vessels and partial thyroidectomy. During the past year several contributions have been made by American surgeons, reporting in each instance a comparatively small number of cases (see table). Huntington and Rixford, together, have performed 7 partial thyroidectomies under a combined local and general anæsthesia, with 6 recoveries, 1 improved, and no deaths. Curtis has operated upon 18 cases, 11 of which were partial thyroidectomies and 7 sympathectomies, all under ether anæsthesia. His mortality was 30 per cent. Witherspoon² recorded his experience in 9 cases, 8 of which were thyroidectomies and only 1 a sympathectomy. Of these, 2 terminated fatally. Olmstead³ and Deaver⁴ have each reported a single case.

| Results. | Anæsthesia. | | Total. | | Cured. | | Improved. | | Unimprov'd | | Died. | |
|------------------------|---------------------------|------------------|-----------------|------------------|-----------------|------------------|-----------------|------------------|-----------------|------------------|-----------------|------------------|
| | Thyroid-ectomy. | Symphath-ectomy. | Thyroid-ectomy. | Symphath-ectomy. | Thyroid-ectomy. | Symphath-ectomy. | Thyroid-ectomy. | Symphath-ectomy. | Thyroid-ectomy. | Symphath-ectomy. | Thyroid-ectomy. | Symphath-ectomy. |
| Kocher | Local. | ..... | 59 | ... | 76.2 % | ..... | 13.5 % | ..... | 3.3 % | ..... | 6.7 % | ..... |
| Huntingdon and Rixford | Combin'd ether and local. | ..... | 7 | ... | 85.6 % | ..... | 14.4 % | ..... | ..... | ..... | 0 | ..... |
| Curtis | Ether. | Ether | 11 | 7 | 54.5 % | 42.8 % | 09.0 % | 14.2 % | ..... | ..... | 27.2 % | 42.8 % |
| Witherspoon . . | ..... | Chlor | 8 | 1 | 75.0 % | ..... | 12.5 % | ..... | ..... | ..... | 12.5 % | 100 % |
| Jonnesco . . . . | ..... | Chlor | ... | 17 | ..... | 89.0 % | ..... | 29.0 % | ..... | 12 % | ..... | ..... |
| Total . . . . . | ..... | ..... | 85 | 25 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |

CHOICE OF OPERATION. It is impossible at the present time to claim for one operation any advantages which will be conceded by any majority of surgeons. The state of uncertainty as to the superior operation is but natural if we realize how ignorant we are as to the

¹ PROGRESSIVE MEDICINE, March, 1903, p. 68.

² Journal of the American Medical Association, July 25, 1903.

³ Philadelphia Medical Journal, March 2, 1903.

⁴ Annals of Surgery, August, 1903.

pathogenesis of the affection which the operation is devised to relieve. As we have already said, until some definite conclusions have been reached, the reasons for accepting one operation in preference to another must be based upon purely hypothetical grounds. Thus, those who believe Graves' disease to be due primarily to a lesion of the sympathetic system advocate sympathectomy, while those who believe that the disturbance of the sympathectomy is a secondary and not a primary condition advocate ligation of the arteries and partial thyroidectomy, separately or simultaneously. It may be of some assistance to one in doubt as to the most suitable operation to consult the statistics. The results which Kocher has obtained are wonderfully good when compared with the results which have been obtained by non-operative methods. But one should remember what Kocher's experience in this field of surgery has been, and how many more opportunities he has had to perfect himself in the technique of this operation than any individual or group of surgeons. It would be very misleading were we to assume from Kocher's work that every experienced surgeon could expect the same results; but looking at the question rather from the standpoint of the operation than from the standpoint of the operator, we ask the question: What are the best results that could be anticipated? The best results in partial thyroidectomy are those of Kocher; the best results of sympathectomy are Jonnesco's. How do they compare?

| | Cases. | Recovery. | Improved. | Unimproved. | Deaths. |
|--------------------------------|--------|-----------|-----------|-------------|---------|
| Kocher. Partial thyroidectomy, | 59 | 76 % | 17 % | 0 | 6.7 % |
| Jonnesco. Sympathectomy, | 17 | 59 % | 29 % | 12 % | 0 |

This table would be a perfectly fair comparison were the total number of cases in each series more nearly even, because each operator in his respective sphere is *principe facile*. Kocher has done hundreds of goitre operations, and Jonnesco a comparatively large number (over one hundred) of cervical sympathectomies. Comparing the results of these two operations, we note at once a difference in several important features. In the first place, Jonnesco did not lose one case, whereas Kocher's mortality was 6.7 per cent.; on the other hand, not one of Kocher's operations were failures, whereas 12 per cent. of Jonnesco's were unimproved. Jonnesco's percentage of improvements was higher than Kocher's, and, *vice versa*, Kocher's percentage of recoveries was higher than Jonnesco's. For each of the operations an advantage can be claimed over the other; but until the number of sympathectomies more nearly approaches the number of thyroidectomies no important deductions can be drawn from a comparison of the results. Among the surgeons throughout the world, I believe, thyroidectomy is still the more popular operation of the two, and has an advantage which

counts for a great deal, namely, that it can be performed under local anæsthesia. Kocher believes so firmly in the dangers of general anæsthesia in operations upon subjects with Graves' disease that it would seem the better part of wisdom to select the operation in which the field of operation can be rendered anæsthetic by remedies applied locally; not that it would be impossible to excise the cervical sympathectomy under the effects of a local anæsthetic—*i. e.*, without the effects of a general anæsthetic—but it would be a very tedious, and by no means painless, procedure to expose and excise the sympathetic ganglia, situated, as they are, so deeply.

In a discussion before the American Surgical Association it was suggested that thyroidectomy be performed as the initial operation in every case, and that sympathectomy be reserved for the relief of certain residual symptoms, such as tachycardia and exophthalmos. This suggestion seems on the surface a reasonable one, and merits consideration. But after all is said and done, we must be content for the present to report the matter as still *sub judice*, and await developments.

TWO FATAL CASES OF PARTIAL THYROIDECTOMY. The causes of death were *tetany* and *hyperthyroidism* respectively. In the first case a severe attack of dyspnoea and laryngeal spasm developed on the second day after the operation, and twelve hours later the hands and feet showed signs of tetany. The symptoms were relieved temporarily by thyroid extract, but recurred nine days later, and the patient died in the second attack from tetany of the respiratory muscles. Madden¹ felt that if he had continued the administration of thyroid extract the second attack might not have occurred. The second case developed symptoms of thyroidism and died twenty-eight hours after the operation.

CONGENITAL GOITRE. This is a comparatively rare condition, and when it occurs the goitre may assume one of three types: the adenomatous, the parenchymatous, and the vascular. Heredity plays an important part in its causation, and the male child is the more frequently affected. Many of these goitrous children are prematurely born or stillborn, and of those that survive many die soon after birth, from the effects of pressure. In Hewitson's² case the child was born in the seventh month and lived but a few minutes. The mother had already given birth to six premature children. At the autopsy a bronchocele about the size of a hen's egg was found, composed of two lobes without an isthmus. None of the structures were subjected to much pressure save the œsophagus, and upon this the tumor exerted so much pressure as to make it difficult to introduce a No. 6 bougie. Upon microscopic examination the specimen presented conditions resembling very closely those met with in exophthalmic goitre.

¹ Lancet, June 20, 1903.

² British Medical Journal, March 21, 1903.

MALIGNANT STRUMA. Ehrhardt¹ presents the results of a very thorough investigation into some of the features of malignancy in the thyroid gland, more especially with reference to metastasis in the lymphatic glands and to the results of operations. From an examination of the records of some three hundred and thirty cases, he was unable to discover the slightest anatomical connection between the two lateral lobes of the gland. The chief lymph channels are situated in the lateral posterior aspects and drain into the deep chain of cervical lymphatics, these in turn emptying into the axillary and mediastinal chains. From the median portion of the gland another lymphatic outlet is to be found leading to the lymphatic glands between the larynx and œsophagus. The dyspnoea and difficulty in deglutition, which occur so frequently in advanced cases, is due not only to infiltration of the laryngeal and œsophageal wall, but to the pressure exerted upon these structures by the enlarged lymphatic glands. Connection between the superior aspect of the thyroid and the submaxillary and sublingual glands has been established, and between the inferior aspect and the mediastinum. Occasionally the superficial and deep glands of the upper portion of the cervical chain become involved.

The results of operative intervention, not only as to recovery from the operation, but as to the period of freedom from recurrence, have improved materially since Koehér inaugurated the practice of resecting when necessary all the structures in the neck which may be involved.

FIBROMA OF THE THYROID. Benign enlargements of the thyroid are usually due, primarily, to an increase in the parenchymatous elements, although, secondarily, certain degenerative changes frequently occur; very rarely, however, as in Delore's case,² one meets with enlargements composed of fibrous tissue—fibromata. There may be but one or a number of encapsulated tumors, or the process may be a diffuse one, in which there is a hyperplasia of the periacinous and perialveolar connective tissue. In the case reported by Delore the tumor was an enormous one, weighing 620 grams, and causing serious pressure upon the adjacent structures. Owing to the hardness and density of fibromata they have been mistaken for carcinomata. The treatment consists in enucleation if the tumor is encapsulated, and of partial thyroidectomy if the process is diffuse.

PERSISTENT THYROLINGUAL DUCT. Whitaker³ records the history of two rather unusual cases of cervical fistula. The first was observed in a child aged five years, in which a few weeks after birth the mother noticed a small lump surmounted by a pin-sized opening on the right

¹ Beiträge zur klin. Chirurgie, Bd. xxxi., Heft 1.

² Revue de chirurgie, June 10, 1903.

³ Annals of Surgery, January, 1903.

side of the neck, 2 cm. above and to the right of the sternocleidoclavicular junction. From this opening a small amount of clear fluid exuded from time to time. At the operation, which was subsequently performed, the lesion was found to be a complete branchial fistula, the internal end of the fistula being situated in the lower border of the right tonsil. The second case was a fistula from a persistent thyrolingual duct in a patient aged eighteen years. The external opening of this fistula was situated in the left side of the thyroid cartilage. At the first operation the fistulous tract was followed up to the body of the hyoid bone and excised intact. At the second operation a branch was discovered which extended up toward the apex of the styloid process of the temporal bone. Still the sinus persisted. The third operation revealed the second projection, which followed the direction of the fetal thyrolingual duct from the foramen cæcum to the body of the hyoid bone. Still the sinus persisted. At a fourth operation, on removal of the body of the hyoid bone, the cause of the failures to effect a cure was discovered. A sac the size of a pea was disclosed, from which exuded the characteristic whitish fluid. The opening into the sac was so fine that no probe could enter, and so small as to be invisible to the naked eye. Excision of the sac resulted in a complete cure.

PERSISTENT THYROGLOSSAL DUCT. Before the New York Surgical Society, Dowd¹ presented a child upon whom he had operated for a persistent thyroglossal duct. Before the operation there was a nodule near the median line of the neck, with a discharging sinus. Upon exposure the duct could be traced up to the hyoid bone and down to the thyroid gland, into which it merged, so that the line of demarcation between it and the thyroid could not be distinguished. A microscopic examination of the mouth of the duct showed a combination of squamous, columnar, and ciliated epithelium. Some sections resembled the mucosa of the cesophagus, some that of the trachea, and others the structures of the thyroid.

PULSATING EXOPHTHALMOS. To an arteriovenous aneurysm, probably in the region of the cavernous sinus, the following symptoms were attributed: Bilateral pulsating exophthalmos, the usual buzzing noise in the head, an elongated pulsating tumor beneath the left ear, and a small, rounded, cavernous tumor just external to the drum of the left ear, with paralysis of the left side of the face. Lilienthal² ligated the right and left common carotid arteries, one two weeks after the other. After ligation of the left carotid exophthalmos and pulsation of the left eyeball became less pronounced, the tumor beneath the ear

¹ *Annals of Surgery*, February, 1903.

² *Ibid.*, March, 1903, p. 443.

disappeared, but the noise and headache were unaffected. After the second ligation the buzzing sound on the right side entirely disappeared, but there was still some on the left. The exophthalmos had diminished markedly, and the headache had practically disappeared.

I presented a case, at a meeting of the College of Physicians of Philadelphia, of unilateral pulsating exophthalmos due to a gunshot-wound. In addition to the marked pulsating exophthalmos there was marked pulsation behind the ear, just below the tip of the mastoid process, and the patient complained of a thumping sound in the head, which he compared to the noise in a factory. Ligation of the common carotid on the affected side was practised, with practically no results; even immediately after the ligature was applied the pulsation and bruit were as marked as they were before. About a year later a ligature was applied to the internal carotid on the unaffected side after the patient had had a preliminary course of the Tuffnell treatment. This was followed by some improvement, although this improvement was very slight. Almost a year after the second operation the patient, after colliding with a playmate, noted that the sound in his head entirely disappeared, and from that time to the present, almost twelve months, there has been no recurrence of any of the symptoms.

THE ŒSOPHAGUS.

In a brief summary of the surgery of the œsophagus, Mixter¹ reviews the chief causes for surgical interference—*i. e.*, congenital malformation, impacted foreign bodies, malignant disease, syphilis, and cicatricial stricture. *Congenital pouches* are much more common than is generally supposed; while they usually do not cause serious inconvenience until later life, there is usually a history of a “small throat” since childhood, and, finally, regurgitation of food. When the pouch becomes dilated the obstruction is such that the patients cannot swallow enough to keep themselves alive. When the pouch is situated in an accessible position the ideal treatment is excision, although, if operation be contraindicated or the pouch inaccessible, considerable relief may be afforded by the passage of bougies. The passage of the bougie in these cases is sometimes very difficult, because the opening is not in the centre but at the side of the œsophagus. In order to find the opening Mixter uses a bougie bent at a slight angle so that the point will hug the side of the canal. This may be best done by a whalebone stylet, bent at the proposed angle by heat, and forced down into a hollow bougie. The best bougies for this purpose are those

¹ Boston Medical and Surgical Journal, August 27, 1903.

which are woven like urethral bougies, with an olive tip, loaded with fine shot. The bulbous probang should be used only for exploration, and not for dilatation.

For the removal of *impacted foreign bodies* gastrotomy or œsophagotomy have great advantages over prolonged and violent attempts with the various kinds of forceps. Only in the hands of an experienced man should an attempt be made to remove these bodies by means of suitably constructed tubes or specula and forceps.

Malignant disease of the œsophagus is seldom situated at such a place that excision of the affected portion can be effectually performed. In the inoperable cases Symond's method of permanent tubage is of great help, but in impassable or irritable strictures an œsophagostomy should be performed if the disease is high up, and should be given preference to gastrostomy.

Cicatricial strictures are generally multiple and often associated with several acquired pouches. Intermittent dilatation may be practised if the stricture is passable, but in the seemingly impassable strictures Dunham's method of getting a guide through the stricture should be tried. It is the greatest improvement in the technique of œsophageal surgery of recent years. By this method Mixter has been able to relieve most desperate and apparently hopeless cases of multiple stricture, and keep the patients from living the rest of their lives dependent upon a tube and funnel in connection with a gastrostomy opening.

Foreign Bodies in the Œsophagus. To minimize the dangers attending the removal of foreign bodies from the œsophagus with instruments, Hamilton¹ suggests an improved method of using the Roentgen rays. The operation is carried on with or without an anæsthetic, the Roentgen rays being placed behind the patient. The operator with the fluoroscopic screen in hand is able to see the foreign body and the instrument in the œsophagus. With the shadow of the object plainly in view the instrument can be properly applied to the same, and the latter removed. With this procedure he has been successful in quite a number of cases.

Tocheremoukhine² restricts the indications for the removal of foreign bodies by instrumentation to those cases in which attempts at extraction by virtue of the nature of the object would prove dangerous. Thus in the case of needles, pins, glass with sharp edges, etc., an œsophagotomy should be performed at once if the object is above the sixth or seventh dorsal vertebra, and a gastrotomy if below this point.

¹ British Medical Journal, February 7, 1903.

² Chirurgie, December, 1903.

THE MAMMARY GLAND.

Tuberculosis of the Breast. Primary tuberculosis of the breast is, as Schley¹ points out, an uncommon disease. Scarcely more than one hundred cases of tuberculosis of the breast have been reported, and of these but sixty-five have been verified by histological examination, and all but twelve were associated with tuberculous lesions of other tissue. Tuberculosis affects the mammary gland usually in the third, fourth or fifth decade, more commonly after gestation and lactation; therefore at that age when the function of the gland is most active. The infectious material reaches the gland either through the ducts, through a surface wound, through the blood or lymphatic channels, or through contiguity of structure. Several varieties have been described: (1) the nodular or discrete; (2) the confluent; (3) the intraglandular cold abscess, and (4) the miliary. (1) In the first, characterized by its chronic course and painless insidious development, the nodules may be single or multiple; they are firm, movable, and may or may not be sharply defined. Schley describes them as resembling lymphatic glands scattered through the breast or situated in the margin. The process may remain confined to the individual nodules, so that finally multiple and distinct abscesses are formed, or they may coalesce and form a tumor of considerable size, and, finally, a single large abscess cavity. In the earliest stage the lesion appears to the naked eye as firm, slightly yellowish or waxed-colored nodules from the size of a pinhead to that of a marble, with a peripheral zone of grayish or bluish tinged and slightly translucent tissue. On microscopic examination the process will be sure to begin as a periacinous and peritubular infiltration, with embryonal cells. (2) The confluent form is more common, more acute in onset, and more rapid in its progress, so that fistulæ develop much earlier. Instead of a number of small tumors a single tumor is found, irregular and nodular, varying in size from that of a walnut to that of an apple, and in consistency according to the stage of the process. On cross-section one or more cavities will be seen with dense walls lined with a soft grayish or purplish membrane. Beyond the mass may be seen fibrous prolongations, and here and there evidences of the extension of the process. (3) The intraglandular cold abscess or third variety is usually the ultimate stage of the confluent form. It occurs more frequently after pregnancy, and is attended with a diminution in the size of the breast. The walls and contents are similar to those met with in tuberculous abscesses of other tissues. In all the varieties the axillary glands may

¹ *Annals of Surgery*, April, 1903,

be enlarged; in fact by some (Halsted and Le Conte) it is believed that in practically every case the infection is retrogressive from the lymphatics of the axilla or thoracic cavity. A band of indurated tissue joining the gland to the axilla is considered a characteristic sign of mammary tuberculosis. It is not always possible to demonstrate the presence of the tubercle bacilli in the tissues. In the early stage pain is not a constant symptom, although in advanced cases pain may be severe. In a few cases the nipple has been retracted.

Tuberculosis of the breast has been mistaken for simple cysts, fibroadenoma, carcinoma, sarcoma, gumma, actinomycosis. In the earliest stages, in the absence of involvement of the axillary lymphatics of any other tissue, the diagnosis may be impossible. The tuberculin test should prove reliable at least in the incipient stages; in the majority of cases the diagnosis was not made prior to the operation. Simple cysts are more circumscribed, fluctuate sooner, are painless, and are not associated with enlargement of lymphatic glands. Fibroadenomata move more readily in the gland, and give rise to no axillary involvement. Carcinomata affect people of more advanced years, grow more rapidly, and are not painful. Sarcomata grow more rapidly, and soon involve the skin; in actinomycosis we see the characteristic yellowish-green granulations.

The prospects of resolution, either spontaneous or after operation, are extremely poor, suppuration always ensues, and the process eventually involves the entire gland.

In neglected cases metastasis ensues in the thoracic viscera, and death ensues.

The best results are to be obtained in tuberculosis of the mammary gland by removal of the breast and axillary glands and the enforcement of strictly hygienic surroundings. It is not necessary to remove the pectoral muscle, and occasionally partial excision of the gland has been practised, although this is not to be recommended. Schley records the history of a case which came under his observation. The diagnosis was confirmed by microscopic examination and by the tuberculin test, applied two weeks after the breast was removed. Had this not been a case of primary tuberculosis the tuberculin test should have been positive and not, as it proved to be, negative. Four years have elapsed since the operation, and the patient still enjoys good health and further evidence of the absence of tuberculosis in any tissue but the breast.

Levings,¹ in writing upon the pathological and clinical features of mammary tuberculosis, points out the connection between the lymphatics of the breast with those of the axillæ on the one hand and those of the

¹ Journal of the American Medical Association, August 1, 1903.

lungs and bronchi on the other, as illustrating the channels through which, in consequence of a retrograde action of the lymph current, the breast may be infected secondarily to the axillary glands or to the lungs and bronchial glands. The lesions of mammary tuberculosis may be mistaken for scirrhus carcinoma, actinomycosis, benign growths, and cysts; from scirrhus by the age of the patient, by the presence of a single and harder nodule; from actinomycosis by the thickened leathery skin and the yellow granules; from fibromata, which are usually single and distinctly encapsulated and without axillary involvement. The greatest difficulty will arise in recognizing multiple cysts, especially when of small size and of inflammatory origin; they are not to be differentiated by touch from solid nodes; but in the absence of enlarged axillary glands and with the aid of the hypodermic needle a diagnosis may be made. Levings believes that very many of the cases of chronic mastitis and most of those of chronic abscess, as well as cases in which there are distinct nodes running a chronic course, are really tuberculous, and that the apparent scarcity of mammary tuberculosis in the United States is due to the failure on the part of the observer to make an accurate diagnosis. The treatment of the condition will depend largely upon the general condition of the patient and the extent of the disease. If the process in the gland is secondary to an incurable lesion elsewhere palliative measures should be adopted. Under other circumstances an attempt should be made to eradicate the disease; a single abscess may be incised, curretted and drained, but if the disease is disseminated it is better practice to amputate the entire breast. Levings reports seven cases, two of which were secondary to tuberculosis of the axillary glands, and one secondary to pulmonary tuberculosis. In five of the six cases operated upon the entire breast or breasts were removed, and five seem to have completely recovered.

Puerperal Mastitis. In order to avoid disfigurement and injury to the milk glands, Bardenheuer¹ makes a semicircular incision around the lower half of the base of the breast; the breast is then detached with the fingers from the pectoral fascia and turned back with the flap. The abscesses are then opened by radical incisions, drainage-tubes introduced into each pocket, and the breast replaced. The position of the tubes is one most favorable for drainage, and the resulting cicatrix will be concealed by the overhanging breast.

Cystic Degeneration of the Mammæ. The relation of cause and effect between cystic degeneration of the breast and carcinoma is one concerning which many conflicting views have been expressed. On the part of some the possibility of a cyst becoming carcinomatous has been

¹ *Centralblatt f. Chirurgie*, Band xxx., No. 33.

denied absolutely, and a conservative course of treatment adopted; others, however, admit the possibility of such a course of events and recommend the removal of the entire breast. Ellis¹ examined a specimen which was removed from the breast of a woman of advanced years. The breast contained a hard nodule, to one border of which was attached a long thin band of tissue having the same general characteristics as the nodule itself. A number of the axillary glands were enlarged and hard. A histological examination of the gland showed not only evidences of a chronic interstitial mastitis and cystic degeneration but undoubted evidences of carcinoma. Many of the cavities are filled with masses of granular debris containing epithelial cells exhibiting varying degrees of necrosis. The most important departure from the normal, shown in certain of the sections, was the presence within the stroma of irregularly outlined masses of polyhedral epithelial cells. These cells were not limited by any membrana propria, but infiltrated the tissue in an irregular manner. At several points in the wall of one of the cavities the epithelial cells lining the wall had broken through and were directly continuous with the irregular masses of cells in the adjacent fibrous stroma. The microscopic study of this individual case is offered as evidence of the possibility of malignant transformation occurring in cystic degeneration.

CHRONIC CYSTIC MASTITIS. An interesting report based upon a very careful histological and clinical study of thirty cases appears in the *Journal of Medical Research*, June, 1903. The authors, Greenough and Hartwell, have discussed the subject more especially as to the origin and nature of the process and of its relation to the possible subsequent development of malignant disease. The clinical picture presented by chronic cystic mastitis may be summarized as follows: An indurated mass of irregular contour and ill-defined margins is found, either diffusely pervading the mammary gland or localized most often in the outer hemisphere. Cysts are frequently observed and may be of considerable size. The mass is generally of slow growth, unless large cysts are present. It is generally, though not invariably, painful and tender to pressure, and often involves both breasts. Discharge from the nipple and diminution in the size of the mass occur but rarely. The disease is found either in single or in married women and generally at the period shortly before the time of the menopause. The skin is not adherent, and the axillary glands are but slightly if at all enlarged.

Of the many terms which have been used to describe the condition of fibrous tissue increase and cyst formation in the female breast at the time of the menopause the name of "chronic cystic mastitis" (Koenig)

¹ *Annals of Surgery*, September, 1903.

is the most satisfactory. There is no evidence to prove that this process is of inflammatory nature, so that the term "mastitis," which is used here, should apply rather to an increase of fibrous tissue of other than local tumor origin. This increase of the fibrous tissue of the breast, which is so conspicuous a feature in chronic cystic mastitis, is the normal condition in the stage of decline of the gland at the time of the menopause. The most striking features of the disease, however, are the formation of cysts and the proliferation of the epithelium of the cysts and acini. In the thirty cases of this series cysts were present in every case; in two cases of microscopic dimensions only, and in twenty-five they were readily seen on careful examination. Cysts are generally produced by dilatation of the smaller ducts and acini, the large ducts show little change in their appearance, though they occasionally appear to be compressed by fibrous tissue. As to the character of the epithelium which is found in this disease, there have been observed all variations from the atypical forms, from columnar cells to papillary proliferation and slight masses of an adenomatous type. The important phase of this subject, from the standpoint of the surgeon, is the question of the transition of the adenomatous types of proliferation to carcinoma. That chronic cystic mastitis precedes and predisposes to cancer was proven beyond question in the histological studies of Greenough and Hartwell, and it should be noted that the transition is to the adenocarcinoma type. Three cases of the series had developed an adenocarcinoma. In their histological studies the authors were able to find all stages of progression between simple hyperplasia of the gland, epithelioma, and actual adenocarcinoma. Recognizing the danger of the transition of chronic cystic mastitis to adenocarcinoma, one must recommend the removal of the entire gland in all but very early and slight degrees of the affection. Thus in certain very early cases, those with slight involvement, in which the presence of a cyst makes the diagnosis positive, delay in the operation may be permissible, but an increase of the indurated area should be considered a positive indication for operation. The operation to be advised is, as a rule, a subcutaneous excision of the entire gland without the removal of the nipple. This can be carried out by means of the Thomas incision under the fold of the breast.

Mammary Cysts. Abbe¹ takes a very firm stand in favor of the conservative treatment of mammary cysts. During the past eight years he has seen in his private practice forty-one cases of mammary cysts and fifty-six cases of scirrhus tumors, in addition to a number of benign growths. Upon his observation of this series of cases, he has

¹ Medical Record, August 15, 1903.

been impressed with two points : First, that the differential diagnosis may be said to be easy and absolute ; and, second, that the cure may

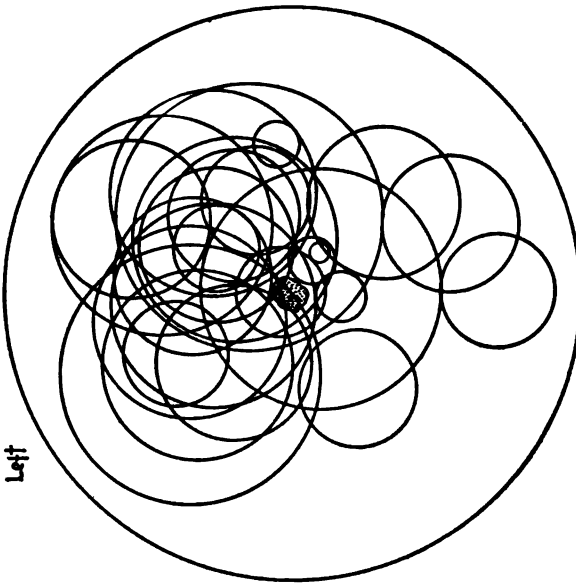
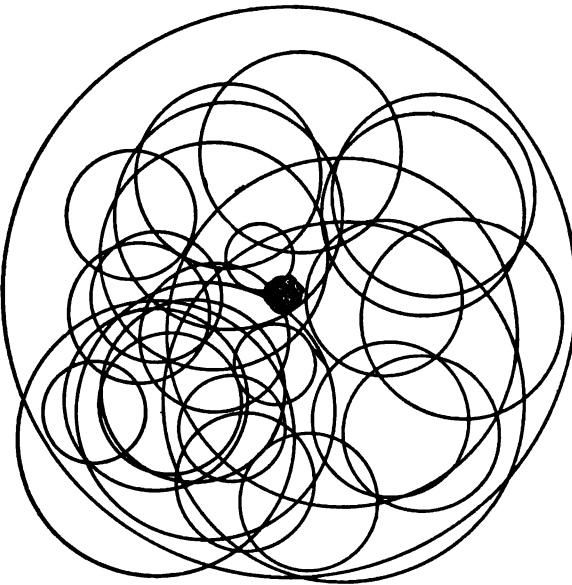


FIG. 3.



also be said to be easy and absolute. In the differential diagnosis between a cyst and a scirrhus tumor of the breast the site of the tumor

should be taken into account; cysts, on the other hand, may be localized in any part of the gland with but a slight predominance in the upper

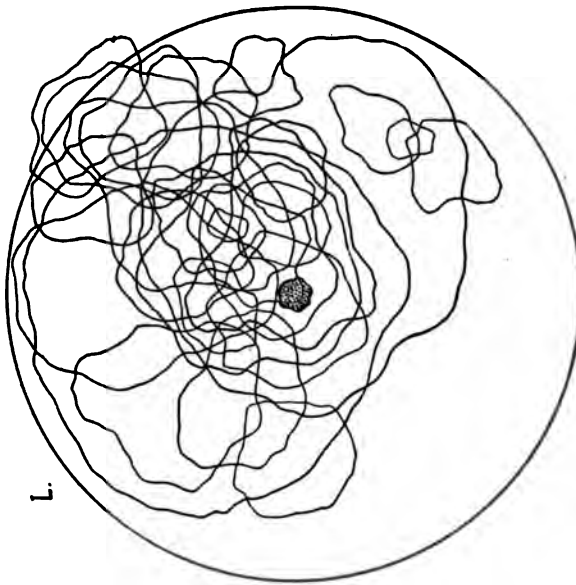
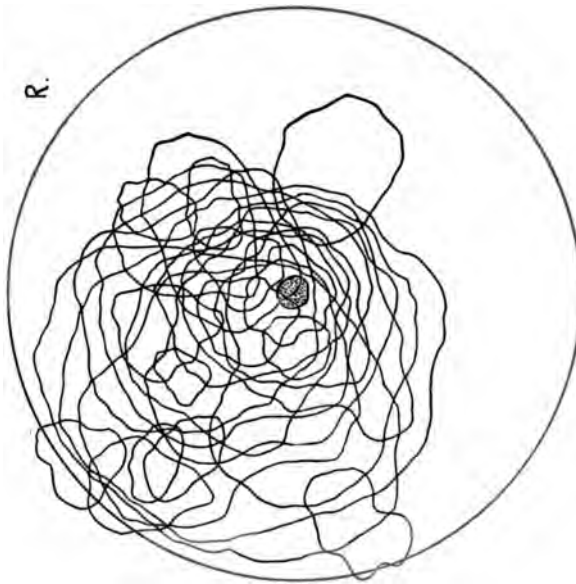


FIG. 4.



and outer segment, while scirrhus tumors are almost universally distributed between the nipple and the axilla. The charts which he has

made to illustrate the localization of cysts in the right and left breast on the one hand (Fig. 3), and scirrhus tumors of the right and left breast on the other hand (Fig. 4), confirm his view as to the assistance to be gained in the diagnosis by considering the localization of the tumor. Of his forty-one cases of mammary cysts three-fourths were single cysts, and in the remaining fourth two, three, and even four were found; thirty-three out of forty-one patients were between forty and fifty years of age, the others were over thirty-five years. The contents of the cysts varied in quantity from one drachm to an ounce, and the fluid drawn was usually opalescent, whitish and turbid. The deposit on standing showed a considerable amount of granular fat, a few leukocytes, and many small and large round mononuclear cells, whose protoplasm had undergone fatty degeneration. As to the gross characteristics of these cystic tumors, the most deceptive feature is their hardness, and in many cases it is impossible to detect the cystic nature without the use of the aspirating needle. Hence the physician should always be ready to pierce every doubtful tumor with a small sharp aspirating needle in order to make his diagnosis certain. The treatment should consist in aspiration alone, unless in certain instances, when excision of the sac, but not of the breast, may be indicated. It stands proved that cases of mammary cyst capable of careful and complete aspiration should never be subjected to any further treatment. It will be cured by that method permanently. Abbe has been in correspondence recently with all of his forty-one patients, and has found that in but two instances has the cyst refilled, and in these the second aspiration was sufficient to effect a cure.

FORCIBLE MASSAGE FOR THE REMOVAL OF CYSTIC TUMORS. Herbert Snow¹ recommends this rather crude method of treating mammary cysts. He places the patients under anæsthesia and then proceeds to rupture the large cyst subcutaneously, and squeezes out the cyst contents. The larger cyst usually ruptures without force, but continued pressure exercised in various directions is needed before the retained secretions can be completely evacuated. Subsequently the organ will be a little sore for a day or two, but as far as he has been able to tell there has been no recurrence after this treatment. He goes on to say that whenever there is any reason to suspect any complication with malignancy that it would, of course, be improper to resort to forcible massage. (The impossibility of determining by superficial examination whether or not the lesion is in a state of transition between inflammatory and malignant process at once suggests itself as an argument against the treatment recommended by Snow.) Incidentally, with

¹ British Medical Journal, October 17, 1903.

reference to the nomenclature of this condition, Snow calls attention to the fact that the word "mastitis" is derived from the Greek "mastos," which means merely the nipple, whereas the Greek word for breast is "mazos," and that, therefore, the proper term for chronic inflammatory processes of the breast is "mazitis."

Relation of Certain Adenocarcinomata to Atrophic Scirrhus of the Breast. Is there a distinctive tumor of the breast properly described by the name atrophic or atrophying scirrhus? Is operative procedure for relief of such tumors to be advised against because experience has shown that such an operation quite uniformly fails to prevent recurrence, and thus shortens life, as recurrences are much more malignant than the original growth? Can these tumors be distinguished morphologically from other malignant tumors of the breast, and do their microscopic characteristics explain this slighter malignancy? These three questions propounded by Stewart¹ may each, in his opinion, be answered in the affirmative. The older as well as the modern textbooks and authorities recognize this type of breast tumor. Its comparative benignancy is attributed usually to a fatty degeneration of the epithelial elements and contraction of the stroma. This change, as Stewart says, undoubtedly takes place in many cases of scirrhus, in some parts of the tumor, but such changes are not incompatible with great malignancy. Stewart explains their comparative benignancy on other grounds, however. In a series of three tumors of the atrophic type he found certain adenomatous features which demonstrated to his mind that in his cases at least the relative clinical benignancy was inherent and dependent on morphological changes, and not upon degenerative changes. These changes are not to be found on the periphery of the tumor, and will be entirely overlooked if sections from other portions are not examined. In nearly every case of breast tumor the advancing edge presents the scirrhus picture, so that if other sections from other areas are not examined the tumor may be erroneously diagnosed as scirrhus. The term atrophic scirrhus should be retained as describing an important clinical entity, but histologically the tumor is of the adenocarcinomatous type, and for this reason comparatively benign. The tendency of modern surgery is toward the indiscriminate removal of all tumors that have a vestige of malignancy, but it is extremely doubtful whether such cases are benefited at all by operation. The older writers taught conservatism, and in Stewart's opinion this doctrine was sound and should still be observed.

Results of Operation in Cases of Advanced Carcinoma of the Breast. The record of the experience of an individual surgeon of

¹ American Journal of the Medical Sciences, September, 1903.

recognized merit is always instructive, and enables one to prepare a more accurate estimate of the value of a particular operation than is possible by collecting a few isolated cases by different observers. Although the merits of the so-called radical amputation of the breast are recognized universally, the collection of additional evidence may serve to confirm the advantages claimed for the operation, and, perhaps, to throw additional light upon one or another of the important features. Pilcher¹ reviews his experience with fifty operations for primary carcinoma of the breast performed between the years 1888 and 1900 inclusive. In seven of them the growth had extended beyond the possibility of entire removal, so that there remained forty-three cases in which a supposedly complete extirpation was carried out. In all the cases the general procedure was conducted in accordance with the teaching that the incisions should go wide of the apparent disease and that the breast and axillary lymphatics, with the connective tissue and fat in which they were embedded, should be dissected out as an unbroken piece.

In reporting the results the cases are divided into four classes, according to the technique employed :

Class I. Ablation complete to axilla, with removal of any pectoral muscle. Two cases. Case I. remained well for six years.

Class II. Ablation complete to apex of axilla, with removal of pectoralis major muscle only. Eleven cases.

Class III. Ablation complete to apex of axilla, with removal of both pectoral muscles. Twelve cases.

Class IV. Ablation complete to apex of axilla, with removal of one or both pectoral muscles, and invasion of the supraclavicular region. Eighteen cases.

Of the two cases in Class I. the *first* remained well for six years after the operation, when symptoms of intrathoracic disease developed which proved fatal within a year. In the *second* case there was a local recurrence in the pectoralis major muscle eighteen months after the first operation, at which time the whole muscle was removed, and five years later a similar disease appeared in the other breast. This was followed in three years by metastasis in the liver, resulting in death ten years after the first operation.

In Class II. the *first* case, at the end of ten years, still remains well. The *second* patient died of cerebral apoplexy one year after operation, having had no sign of recurrence up to the time of her decease. The *third* case, at the end of eight and one-half years, remains well. The *fourth* case remained well for six years ; during the seventh year there

¹ Annals of Surgery, September, 1903.

became evident carcinoma in the ribs behind the site of the primary disease. This has very slowly advanced, and the patient is still living, though in feeble health, nine years after operation. The *fifth* case, at the end of eight years, remains well. The *seventh* case died two years after operation from intrathoracic metastasis. The *eighth* case is the one mentioned in the preceding class, in which disease appeared in a second breast six and one-half years after the removal of the first breast for cancer, and in which case ultimate death resulted three and one-half years after the last operation from supposed carcinoma of the liver, no local recurrence having taken place. In the *ninth* case, six months after operation, the supraclavicular glands were perceptibly enlarged; the space above the clavicle was then cleaned out, but it was then found that the disease had extended into the mediastinum. Death followed within two years. In the *tenth* case the patient was well one year after the operation, since which time no report has been obtained. The *eleventh* case died two years after operation, with local and regional recurrence. These classes comprised those in which the disease had made the least advance. In three cases the result showed that the primary operation was not complete. While there was such a large proportion of absolute recoveries or of freedom from recurrence for many years is full of encouragement, it is probable that the number of definite cures would have been larger had the operative attack been more radical, in the removal of a greater area of skin, of the pectoralis minor muscle, of more of the axillary connective tissue, and the extension of the incision above the clavicle.

Class III. was comprised of those cases in which the disease had attained a more advanced stage. The character of the results obtained by operation present marked change from those of the preceding classes. "Twelve cases are included in this class. In one case the later history is unknown; of the remaining eleven one lived five and a quarter years after the operation free from recurrence, and then died from an acute pneumonia at the age of seventy years. Two others are well at the present time, three years and three years and four months, respectively, after the operation. One is living, five and a half years after operation, but with slowly advancing recurrence in axilla and above the clavicle. One other is still living, three years after operation, without external recurrence, but with evidence of carcinoma of the liver. Six patients have died at periods varying from twelve months to five years and a half after operation."

In all but one of these cases the development of supraclavicular disease was among the earliest evidences that the primary operation had been incomplete. In so many instances was it possible to demonstrate the involvement of the lymph glands above the clavicle that, notwith-

standing no such glandular involvement was perceptible to examination, it seemed to Pilcher to be reasonable to regard the supraclavicular lymphatic tissues as diseased in all cases in which glands at the apex of the axilla were markedly affected, and that in all such cases the rational procedure for the surgeon to pursue was to open up and clean out the supraclavicular fossa. This procedure was adopted in eighteen cases, in but ten of which palpable nodes existed.

In connection with what Pilcher has to say regarding the supraclavicular involvement, I may quote the statistics from von Bruns' clinic,¹ in which from 1880 to 1902 there were forty operations in which the supraclavicular glands were involved and removed. Thirty-eight of these forty have already died, and of the two surviving both have inoperable recurrences, which will soon prove fatal. No case has therefore been permanently cured. Every case in which the supraclavicular glands are already enlarged should be given, without question, an absolutely unfavorable prognosis; an operation can have but a palliative effect.

Class IV. Of this class but two cases have remained well, and these have passed, respectively, four and a half and six years since operation, in good health and free from recurrence. One is still alive (two and one-half years), although she has recurrence in the costochondral articulation on the affected side, and the others are all dead. The mortality of the entire series was low; there was but one operative death. Pilcher's experience in these years has emphasized the fact that nothing is more illusive than the apparent local extent of the carcinomatous process. Practically every case of carcinoma of the breast, when it reached that degree of development by which a palpable tumor is formed, is already in an advanced stage, so that only by an immediate and far-reaching removal of both the discernible disease and the adjacent tissue can even a moderate probability of permanent cure be assured. If operations are undertaken as soon as the disease is noticed, surgery can promise a very large proportion of absolute cures. Unfortunately both patients and physicians are still guilty of procrastination, so that in the majority of instances the tumor has been present for at least a year, and has reached the advanced stage.

X-ray Treatment of Mammary Carcinoma. Although recognizing the fact that the subject is quite *sub judice*, Morton² entertains most sanguine views as to the results which may be expected of the x-ray treatment. Taking conservatively into account both successes and failures in the reported cases, there is, he believes, ground for the belief

¹ Beiträge zur klinische Chirurgie, Band xxxvi., Heft 2.

² Medical Record, May 30, 1903.

that in the *x*-ray we possess a relief or cure for cancer, especially in its early stage, which in the ultimate results compares favorably with operative treatment, and that it would seem *that a case of primary carcinoma of the breast may as hopefully and with as little ultimate danger to the patient be submitted to the x-ray as to any other procedure.* If, as many believe, the *x*-ray should be applied after operation, to prevent recurrence, and should be applied in cases of the inoperable type, why should we not assume that it is equally effective in the treatment of the primary growth? At the present time the profession, I do not believe, has sufficient confidence in this treatment to recommend it for the incipient cases, feeling that in so doing valuable time may be lost, so that in the event of a failure in the *x*-ray treatment the time most favorable for operation will have passed. And yet, according to Morton, excluding the superficial cutaneous lesions, the most favorable cases for the *x*-ray treatment are the early cases; "the newer the new-growth is the more certainly will the *x*-ray act favorably upon it." If the operation could preclude positively a recurrence, or, on the other hand, if the *x*-ray could promise a certainty of cure, there would be no hesitation as to the advice which should be given.

In the state of our present knowledge it would be impossible to state upon which class of cases the *x*-ray seems to exert the most favorable influence. From his own experience Morton has noticed, first, that when there is an open ulcer with much secondary septic infection the case is almost sure to progress unfavorably; and, second, that the more preponderant the scirrhus or fibrous character of the lesion the slower is the action of the *x*-ray. But with these exceptions it must be admitted that there seems to be no means of determining in which group of cases the most favorable results are to be anticipated. In certain cases, in spite of the most faithful treatment, the *x*-ray does not exert the slightest retarding effect, while in others the disease disappears entirely under its influence.

Morton reports a series of selected cases in which the *x*-ray has relieved or caused to disappear the evidences of disease. Upon studying these records one cannot but conclude that the results in these cases, at least, is all that could be desired. Included in the series are cases of the incipient stage as well as those of the advanced stages, with axillary involvement. The treatment consisted in the use of a high tube, at nine inches, for fifteen minutes, three times weekly. No shields are used except for the protection of the head, eyes, and nipple. A dermatitis is intentionally carried to a red-purple stage, followed by exfoliation of the epidermis and effusion of serum, and in certain cases purulent effusion. These areas of dermatitis have often occupied the entire skin area of one breast and axilla. The patients are frequently

x-rayed from behind the scapula, the fluoroscope showing that the thoracic cavity offers but small obstruction. The advantage of this mode of application is twofold: in the first place, it enables the treatment to be continued when a dermatitis has developed too soon to warrant the continuance of exposure in front; and, second, it enables the rays to reach those lesions which may be behind the anterior portion of the ribs. Morton believes the influence of the *x*-ray to be due in part, at least, to its excitation of a mild leukocytosis with tissue reparation; inasmuch as the skin intervenes between the tube and the tumor, the skin must suffer a dermatitis in order to enable the operator to set up a similar but lesser lesion in the deeper tumor area. In the superficial or ulcerating carcinoma or superficial recurrent carcinoma of the skin, a milder treatment, with no dermatitis of note, will excite a leukocytosis sufficient to effect a cure.

The attitude which the profession at large, more particularly surgeons, should take in this matter is one of great moment. The responsibility which the physician must assume in deliberately recommending phototherapy to the exclusion of surgical procedures for carcinomata of the early stages is not to be considered lightly. The patient's life may hang in the balance. The problem with which we are confronted is a most difficult one. The difficulty arises, of course, because we are called upon to compare in the operative treatment a mode of procedure which has been practised for many years, the technique of which has been perfected, and the results of which both as to the immediate and ultimate effects of the operation can be expressed with mathematical precision, with a procedure which, in so far as the statistics of recovery and freedom of recurrence is concerned, must be admitted to be an unknown quantity. Through the columns of medical journals our attention is drawn only to the favorable cases; the unfavorable cases do not find their way into print. Thus, in the article by Morton, which has just been reviewed, a few favorable cases have been selected for immediate publication, while the report of the unfavorable cases has been reserved for some subsequent occasion. The profession is quite aware of the fact that the *x*-ray can effect a cure; but it is not interested in reading the report of a few favorable cases here and there, but it does want to know what the results have been in all (not the selected) cases of any one or a number of competent observers. What is the percentage of cases both primary and secondary, operable and inoperable, in which the growth has disappeared under the *x*-ray treatment? What is the percentage of recurrence? In what percentage is their freedom from recurrence for a period of three years? Answers to questions such as these must be submitted before intelligent opinion can be formed. My own experience has been anything but encouraging. I

have seen a number of cases where the primary growth seems to have been held in check, but where, meanwhile, metastatic lesions were developing in the internal organs. I have seen a malignant tumor of the breast in a woman thirty-five years of age, who refused operation, steadily grow until it reached the inoperable stage, despite the fact that the treatment was begun when the growth was very small, and was applied with regularity. Only a short time ago I saw a patient who for a whole year was treated in New York City with the *x-ray* for a tumor which at the first observation was a very small one. The medical attendant advised *x-ray* treatment, and proceeded to apply the treatment for a year. When the patient applied to me for relief the growth was as large as an orange, had ulcerated through the skin, and was adherent to the thoracic wall; the patient herself was cachectic. On the other hand, I have seen a very extensive carcinomatous infiltration of the skin and deep tissues disappear under the influence of the *x-ray*; and again other cases of the inoperable type in which exposure to the *x-ray* afforded almost absolute relief from pain, and in ulcerative cases abolished the offensive discharge.

I do not want to be construed as being skeptical, because the results of operative treatment are anything but brilliant, and surgeons can ill-afford not to encourage any plan of treatment which offers but a reasonable hope of success greater than he can hope to obtain with the knife. Just at this juncture in the development of phototherapy or radiotherapy, the claims for this treatment have not been substantiated sufficiently to warrant our discarding a method which has been tried and the results well known for a method which is still *sub judice*.

It is my practice to prescribe after amputation of the breast a prolonged course of exposure to the *x-ray*, with the hope that, at least, the possibility of local recurrence may be reduced to a minimum.

Paget's Disease. Misconceptions regarding the actual nature of Paget's disease are very common. To those not familiar with the most modern views it is regarded as an eczematous condition of the nipple and areola, terminating in epithelioma or in carcinoma. Jackson¹ says that "Whatever the genetic connection between the skin lesion and the breast tumor may prove to be, it is quite certain that in the reported cases which have been examined microscopically and in the present case the tumor of the breast is not an epithelioma; nor have any authentic cases of an epithelioma growing from the epidermis of the nipple and areola, on the basis of a Paget's disease, or from there invading the breast, been reported. On the other hand, speculation in this regard has been most industriously indulged in." Jackson

¹ Journal of Cutaneous Diseases, May, 1903.

presents a case of Paget's disease associated with, although having no connection with, carcinoma of the mammary gland. The changes in the skin which were observed in the histological examination of the specimen, namely, infiltration in the papillary layer, proliferation and degeneration of the epidermis proceeding to complete ulceration, are characteristic of Paget's disease, or, as this affection has been termed by Thin, malignant papillary dermatitis. The character of the process is distinctly inflammatory. The lesion differs as widely from eczema as it does from epithelioma, and its differentiation from acute eczema is so patent that it need not be discussed here. Chronic eczema, to which this disease has so frequently been likened, and with which it has so frequently been confused, differs in the subsequent degenerative character of the process, ending in complete ulceration. The misconception of epithelioma originating from Paget's disease lies in the fact that carcinoma originating in the lactiferous ducts may infiltrate the corium to a considerable extent. "The cells derived from the epithelium of the large lactiferous ducts closely resemble the lower cells of the epidermis, which is not surprising when we consider the close genetic relationship of the ducts with the epidermis of the nipple and areola. The true origin of these cells infiltrating the corium may be overlooked, and from their close resemblance to the cells of the epidermis may be ascribed to an invasion of the epidermis. With elongation of the inter-papillary projections of the epidermis characteristic of Paget's disease, and with the papillæ invaded by carcinoma, the sections are often very confusing. Where the epidermis, previously changed by Paget's disease or not, has ulcerated over an area of corium infiltrated with carcinoma, the condition may at first be mistaken for epithelioma originating from the epidermis. More extensive examination of such specimens, including the edge of the ulcerated area, and the region of the larger lactiferous ducts as they pass through the corium, will clear up the true origin of the growth from the lactiferous ducts." The present state of our knowledge of the genetic connection between Paget's disease and malignant papillary dermatitis, Jackson maintains, is a matter of speculation. "The two affections, although they are frequently associated, and, as pointed out, bear some points of resemblance, are, nevertheless, essentially different. The theory that the skin affection is caused by the irritation of carcinomatous material discharged from the ducts fails to meet the cases in which the skin affection precedes the appearance of a tumor by many years, or is not followed by a tumor at all. On the other hand, the theory that the process, beginning as a surface infection, creeps down the ducts was based on a misinterpretation of cell inclusions as parasites. Moreover, the process in the epidermis and in the ducts is not the same. From the fact that malignant papil-

lary dermatitis is incurable, and in the majority of cases is associated with carcinoma of the breast, the extirpation of the breast with the diseased area of the skin, without waiting for the clinical diagnosis of a tumor of the breast, seems advisable. A 'duct carcinoma' may be slow in growth. Moreover, the resistance or mass felt beneath the skin, upon which the diagnosis of tumor is usually made, is really due in many cases more to the dense fibrous stroma than to the actual increased amount of epithelial or carcinomatous new-growth. Yet tumors of this description may, when their epithelial elements once gain access to lymphatics, produce extensive metastases, which, from the clinical appearance of the primary tumor, are entirely unexpected."

PAGET'S DISEASE AND ATROPHIC SCIRRHUS. Because of the co-existence of a benign and malignant condition and the undoubted evidence of the etiological relation of previous long-continued irritation and inflammation, Elder¹ puts on record a case of atrophic scirrhous of one mammary gland associated with Paget's disease of the nipple of the opposite side. The patient was forty-one years of age, and during the several periods of lactation had had mammary abscesses and fissured nipples. The presence of these long-continued and frequently recurring attacks of mastitis produced an irritation which so often precedes cancerous degeneration. The case was treated by amputation of both breasts.

Supernumerary Breast in the Male. Concerning supernumerary breast development, Roger Williams writes that "in animals axillary mammae are most exceptional, but they are met with in the pteropi (fruit bats) and in the galeopithecus or flying lemur;" and of the human kind he says that, while he has found numerous instances of so-called axillary mammae in the female, when he comes to examine these cases critically only a very few of them can be definitely accepted as such; most of them are of the nature of axillary mammary extensions or sequestrations. *He has not met with a single instance of the kind in a male.* Griffith² presented the history and photographs of a case which had a large, well-developed mammary gland occupying the site of the right axilla (Fig. 5). The patient was twenty-five years old, a native of one of the interior villages on the west coast of Africa. The tumor was first noticed when he was fifteen years of age. It presented the physical characteristics of a freely movable gland of the female breast. Handling and work caused no pain or discomfort, and active movements of the arm were not impeded by the tumor bulk. The nipple is erectile and stands out prominently upon the areola; the

¹ Montreal Medical Journal, December, 1903.

² Indian Medical Gazette, January 3, 1903.

skin over the nipple and areola are somewhat lighter in color than the surrounding skin. Manipulation and milking of the breast demonstrated that there was no fluid present and no opening through the central pore.

SCIRRHUS OF THE MALE BREAST. Cancer of the male breast occurs in about 0.5 per cent. of all cases of breast cancer. An instance of this comparatively rare condition is reported by Bell.¹ The patient was fifty-six years of age when he was examined, and at that time the lesion was four and a half years old. There was a large, excavating, ulcerated surface involving the right breast; the edges were hard, raised, and

FIG. 5.



everted. The surrounding skin was œdematous, but no glands could be felt in the axilla. A radical operation was performed, but the growth recurred fifteen months afterward, and three months later the patient died with metastatic deposits in his liver and elsewhere.

TUMOR OF THE MALE BREAST. Peck presented to the New York Surgical Society² a man, thirty-six years of age, who had had a tumor of the right breast for about ten years. The tumor, which presented characteristics of a benign growth, was excised, together with the overlying skin and all the tissues down to and including the pectoral fascia.

¹ British Medical Journal, February 14, 1903.

² Annals of Surgery, September, 1903.

Up to the time when this report was presented no satisfactory pathological report had been obtained; three competent pathologists were unable to determine either the nature of the tumor or the question of its malignancy.

TUBERCULOSIS OF THE MALE MAMMARY GLAND. While tuberculosis of the female breast is an uncommon affection, tuberculosis of the male breast is still more rare. Morestin¹ reports a case occurring in a man, aged fifty years, who had suffered for four years from a right-sided pleurisy, followed by repeated attacks of bronchitis, but without distinct evidences of tubercle. The mass, which was about the size of half a hen's egg, was removed, together with an axillary gland, and upon microscopic examination proved to be of tuberculous nature.

BRONCHOTOMY AND ŒSOPHAGOTOMY.

The posterior mediastinum is the one region of the human body upon entering which surgeons almost invariably have been baffled in their attempts to bring to a successful issue operations upon the structures therein contained. The indications for invasion of the region have been either foreign bodies in the bronchi and œsophagus, malignant disease of the œsophagus, and mediastinal abscess. Both Milton and Ricard failed in their attempts to remove foreign bodies by the anterior route—*i. e.*, through the anterior mediastinum—which they advocated; and others have failed in a like attempt *via* the posterior mediastinum. Enderlen is the only one who has successfully performed a posterior mediastinal œsophagotomy. The embarrassment offered by the large vessels in such close proximity to the bronchi, and by the respiratory movements, the danger of injuring the pleura, and the likelihood of wound infection, are the most troublesome complications of a mediastinotomy.

Nassilov, in 1888, carried out a series of experiments on the cadaver to determine the feasibility of removing the œsophagus through the posterior mediastinum. Quenu and Hartmann, in 1891, and Potarca, in 1893, also pursued this line of investigation. Kocher, in 1891, removed a carcinoma of the œsophagus from the cadaver through the route suggested by Quenu, and Levy, in 1898, continued these experiments on dogs and cadavera. On the living subject but seven operations have been performed for lesions of the œsophagus: two by Rehn, one for cancer and one for stricture; one by Fergue for the removal of a foreign body at a level of the fourth intercostal space; one by Lloubet for two cicatricial stenoses; one by Enderlen for the removal of a

¹ Bull. et mém. de la Soc. anat. de Paris, June, 1902.

foreign body, and two by Faure. Both of Faure's patients died, one within twenty-four hours. In neither case could death have been attributed to severe hemorrhage or shock, but probably to respiratory embarrassment attending the pneumothorax. The circulatory disturbance which both patients exhibited may have been due to the effect of the alteration of intrathoracic pressure upon the venous circulation.

Technique. Simple exposure of the contents of the mediastinum or the opening of a mediastinal abscess is one thing, but it is quite another to remove any of the contained structures. There is very little choice between the two sides, except in so far as the danger of wounding the thoracic duct might prompt one to select the right. The second to the sixth rib must be excised and the first rib divided, as this of itself allows the wound to gape and affords a better exposure. Once the œsophagus is reached, according to Faure,¹ the mode of procedure will vary according to existing conditions. If the neoplasm is immovable and adherent to surrounding structures the attempt must be abandoned, otherwise it should be removed, even though the two ends cannot be brought into apposition. Both ends should be closed under the circumstances, and the patient fed through a gastric fistula. Even were it possible to bring the ends into apposition such a plan should not be recommended, as the circulation of the œsophageal walls is not such as to favor repair.

Foreign Bodies in Bronchi. In the case of foreign bodies in the bronchi, we must for the present be content to remove them by instruments introduced through a tracheotomy wound. Helferich² removed a metal-pencil holder, which had lodged opposite the sixth and seventh ribs, through the aid of an improvised probang. This consisted of a short rubber finger-cot, over the end of which a hollow metal tube was tied. It was intended that the probang should be passed into the bronchus beyond the foreign body, the finger-cot distended with air, and the instrument withdrawn, carrying the pencil-holder with it. But failing in this the instrument was passed directly into the open end of the holder. By inflating the finger-cot with air it became so wedged within the pencil-holder that the latter was easily withdrawn. Bogorad³ almost succeeded in reaching a button lodged in the right bronchus by exploring the lung with a Paquelin cautery in the direction in which the object was lodged. After failing in the two attempts the patient succumbed to a fatal hemorrhage. At the autopsy the foreign body was found very near the end of the passage which the operator had made in his search.

¹ Bulletin et mémoires Société de biologie, vol. xxix., No. 4.

² Deutsche Zeitschrift f. Chirurgie, Band lxvii.

³ Die Chirurgie, Band xi.

THE HEART.

Resuscitation by Massage of the Heart. This method was first suggested by Maurice Schliff, in 1874, but it was not until 1898 that it was applied to man. Since that time many reports of the results of experiments upon dogs and of many unsuccessful attempts upon man have come to our notice. The possibility of resuscitating the suspended action of the heart in the dog until reaction is complete has been proved beyond a peradventure of doubt on many occasions; but in man, while some have succeeded in reviving the heart for a short time, in one instance for twenty-five hours, there has been no cases in which this method has proved itself to be a life-saving measure.

Spina, of Prague, carried on a series of experiments in which he attempted to prove that the major factor in restoring heart action is the filling of the vessels with fluid. The heart will not respond to the stimulation of massage or compression unless there is some fluid within the heart cavities. Spina injected into the veins of a dog 200 c.c. of a physiological salt solution; this forced the blood along before it, and when the semilunar valves were reached the stream closed them and the blood was driven into the coronary arteries. By this method he was able to restore the heart action even when the cerebrospinal system had been destroyed, or when the animal had succumbed to the action of poisons. This method should be applicable to man.

Velich¹ repeated the experiments of Kuliabko, who was able to resuscitate the isolated heart of an infant twenty-four hours after death. He found that the isolated heart could be made to contract by forcing into it Lock's solution even after the heart had been removed and buried in snow for a period of eighteen hours. In one instance the contractions of the heart were revived even after the heart had remained in a frozen salt solution for a period of twenty-four hours.

Zesas² reports what he claims to be the first case in which cardiac massage was applied in the treatment of a case of chloroform syncope. Before the operation had begun the heart's action suddenly ceased; failing to resuscitate the patient by artificial respiration, Professor Niehaus rapidly exposed the heart by a resection of the ribs, practised rhythmical compression of the heart, and continued artificial respiration. The heart, which at first was flabby, became somewhat more firm, and there was a slight tremor of the muscle, but a normal contraction did not occur, and the attempt at resuscitation failed.

Bourcart³ describes a method which he has practised upon dogs, and

¹ Münchener med. Wochenschrift, 1903, No. 33.

² Centralblatt f. Chirurgie, 1903, No. 22.

³ Revue médicale de la suisse romande, October 20, 1903.

can be applied to the human subject. The patient is placed in a position to relax the diaphragm, by slightly elevating the pelvis; after opening the abdomen the hand is introduced and the heart seized through the diaphragm. Great care must be taken not to compress the coronary arteries nor bronchi during the operations; injections of normal salt solution or of 1:10,000 adrenalin hydrochlorate are useful adjuvants.

It should be remembered by all those who may be optimistically inclined that such an operation upon the heart, whether by the diaphragmatic or thoracic route, is one of a very serious nature, and should not be undertaken unless every other possible restorative has been thoroughly tried. If under these conditions the operation is decided upon, the diaphragmatic route is to be recommended, because it saves time, and because massage practised through the diaphragm appears to be equally efficacious with that applied directly through the opening made in the chest wall.

Cardiolysis. Not content with the success achieved in the treatment of wounds of the heart, surgeons have taken it upon themselves to suggest a remedy for the relief of so-called adhesive pericarditis. A year ago Brauer¹ recommended a novel method of treatment, which he called cardiolysis, for certain cases of so-called adhesive mediastinal pericarditis, those cases in which the adhesions are not within but without the pericardial sac. Adhesions resulting from a mediastinitis or pleuritis bind the heart, pericardium, and large vessels to the neighboring structures (sternum, posterior mediastinum, diaphragm, and lungs). Either these structures must move with the movements of the heart or they will interfere with the heart's action. As a result of such interference certain clinical phenomena, quite peculiar to the condition, are evoked—*e. g.*, cardiac insufficiency, cirrhosis of the liver, with ascites and dyspnoea. On palpation a strong pulsation may be felt, and on inspection the thorax in the pericardial region may be seen to be drawn in with each systole. Auscultation will reveal, in addition to the normal heart sounds, an additional sound which followed the second normal heart sound. The prognosis in these cases is grave; the mechanical interference of the heart's action eventually leads to a condition of insufficiency. It is the object and purpose of the operation to relieve the heart of its embarrassment by removing a portion of the fixed structures to which the adhesions are attached, namely, the thorax. The operation consists in a resection of a portion (5 cm. to 7 cm.) of the fourth and fifth ribs. It has been suggested that an attempt be made to free the adhesions without removing any of the bony

¹ Archiv für klinische Chirurgie, Bd. lxxi., Heft 1.

chest wall; but such a procedure would be very difficult of execution, and in no way prevents the recurrence of adhesions.

The results of the operation are recorded as more than gratifying. In the three cases in which it was carried out there was a very marked improvement; the œdema, the dyspnoea, and cyanosis as well as the ascites disappeared. In two cases the patients, from being bedridden, returned to work, while the third died of some intercurrent affection one month after operation.

Talma's Operation for Ascites Resulting from Cardiac Adhesions.

The application of Talma's operation has been restricted to those cases in which the ascites is due to a cirrhosis of the liver. Lesions of the heart or kidney have been considered rather as contraindications, but Clemens¹ reports a case in which Kraske performed the operation upon a patient for the relief of persistent ascites attributed to a pericarditis and the resulting adhesions. The operation was partially successful. The ascites returned, but there was not sufficient fluid in the abdomen to require aspiration as was the case before the operation.

Heart Wounds. One year ago² a table was published containing statistics upon thirty-nine cases of operations for closure of heart wounds. Since that time I have been able to collect twenty-one cases, twelve of which appear in Wolff's table of thirty-nine cases,³ and the following nine cases which have appeared in various journals in the current year:

1. Schwerin,⁴ at the last Congress of the German Surgical Society, reported a successful operation for punctured wound of the right auricle. The patient was pulseless and in deepest collapse. There was a wound in the fourth interspace on the left side. The heart was rapidly exposed, and the existence of a cardiac wound indicated by the issue of a large and forcible jet of blood. The heart was brought near the external wound by means of a suture introduced through the apex and the wound in the auricle thus freely exposed was closed with three silk sutures. In spite of the subsequent pyopericarditis, empyema, and pneumonia the patient ultimately recovered, and was able to resume his occupation as a butcher.

2. In Milesi's case⁵ the wound was at the base of the right ventricle. When the pericardial sac was opened the heart had ceased beating and the hemorrhage was so free as to mask everything. The operator grasped the heart, compressed it repeatedly, when suddenly the hemorrhage ceased and the heart began to contract. The wounds in the heart and pericardium were closed. The operation was performed under

¹ Münchener med. Wochenschrift, June 2, 1903.

² PROGRESSIVE MEDICINE, March, 1903, pp. 102, 103.

³ Deutsche Zeitschrift für Chirurgie, Bd. lxxix., Heft 1.

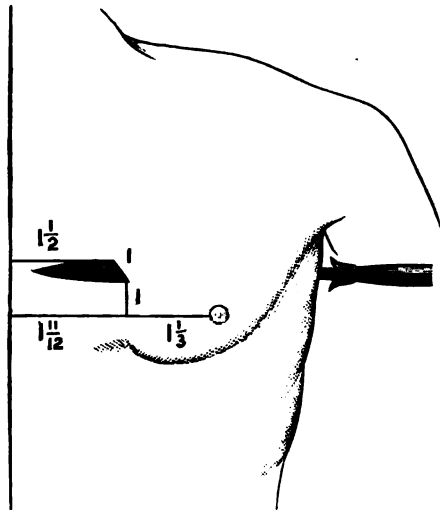
⁴ Centralblatt für Chirurgie, No. 36, 1903.

⁵ Il Policlinico, May, 1903.

chloroform anæsthesia, although a very small amount was used. The patient reacted from the operation, but died twenty-four hours later. At the autopsy, in addition to a wound of the ventricle, a perforating wound of the intraventricular septum was found and one of the muscoli papillares was found to be severed.

3. and 4. Giordano¹ reports two cases: one a stab wound in the sixth interspace in the left side, penetrating the left ventricle near the apex. The wound was closed with two silk sutures, but the patient died one hour and a half after the operation was completed. In the second case there were two wounds in the fourth and fifth interspaces. The pericardium was filled with clots, and a wound 2 cm. long was

FIG. 6.



discovered in the left ventricle. This was closed with two silk sutures. The patient recovered after a prolonged convalescence, complicated by infection around the seat of operation.

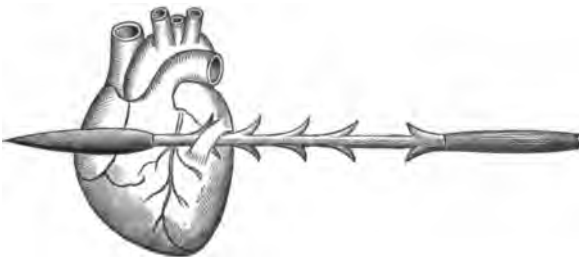
5. McArdle² treated a patient who was admitted to the hospital with a barbed spear stuck in his chest (Fig. 6). There was some difficulty in breathing, slight pain, and slight oozing from the wound. An attempt to withdraw the spear caused considerable pain. On the following day there was orthopnoea, the pulse-rate was 92, and the respiration 28. The cardiac sounds were tumultuous and oppressed, but like those of an engorged heart. "Under chloroform a Γ -shaped incision was made, the vertical portion corresponding to the entrance wound,

¹ *Gazette degli Ospedali e delle Cliniche*, January 11, 1903.

² *Journal of the Royal Army Medical Corps*, August, 1903.

the horizontal portion being six inches long and carried around the chest forward. Through this incision two inches of the sixth rib were removed and six barbs of the spear freed. The spear was thought to be free, and traction was made on it; but the effort caused sudden syncope and gasping respiration. At the same time a free muscular mass appeared in the wound, a piece of which held another barb, as shown in the diagram (Fig. 7). This fleshy fragment, which was about one-eighth of an inch thick, and caused by the spear passing through the margin of the left ventricle, was now divided, the spear was rapidly withdrawn and the wound was plugged with a sponge. Gradual restoration of pulse and respiration followed; the wound was sutured, etc., and the patient put to bed. The man recovered consciousness in a few minutes, with respirations of 40 and a pulse of 100. In the evening the heart sounds were clear and unlabored, in contrast to the condition before operation. Recovery was uninterrupted."

FIG. 7.



6. Zoll¹ presented to the Thirty-second Congress of the German Surgical Society a case of gunshot wound of the heart which was treated successfully by operation. An exploration was made, and upon finding the perforating wound in the anterior wall of the left ventricle the sutures were introduced, while the heart was steadied by means of an artery clamp applied beneath the coronary artery. The patient recovered, although his convalescence was complicated by an encapsulated pyema.

In addition to these Barth,² in the course of the last year, has practised cardiac suture in three cases of punctured wounds, in one of the right and in two of the left ventricle. One case died in the fourth day from pericarditis and bilateral pleurisy; the other two recovered.

Results. Up to the present time at least sixty cases have been reported; of this number thirty-five (58 per cent.) died and twenty-five (42 per cent.) recovered. Taking into consideration the fact that a number of the fatal cases died on the table from hemorrhage or the result of shock, not necessarily because of the operation, but rather as

¹ Centralblatt für Chirurgie, No. 36, 1903.

² Ibid.

the result of the injury, we have every reason to feel encouraged. The percentage of recoveries in untreated cases is 10 per cent.; excluding cases in which the patient died rather in spite of than because of the operation, the percentage of recoveries may be conservatively placed at 50 per cent. The prognosis after injuries of the left ventricle is better than after injuries to the right ventricle, because the patients are not so liable to bleed to death on the spot. The wall of the left ventricle, being the thicker of the two, offers greater opportunities for temporary spontaneous closure. Injuries to the coronary arteries were at one time regarded as exceedingly grave, but the case of Pagenstecher has proven, in confirmation of Bode's experiments, that the nourishment of the heart can be sustained even when the circulation of the coronary artery is interrupted by ligation.

TABLE OF TWENTY ONE CASES NOT INCLUDED IN THE SERIES OF THIRTY-NINE CASES PUBLISHED IN PROGRESSIVE MEDICINE, MARCH, 1903, PAGES 102 AND 103.

| No. | Operator. | Chamber wounded and size of wound. | Results and remarks. |
|-----|-------------------------|--|--|
| 40 | Kosinski | Stab wound right ventricle; suture. | Recovery. |
| 41 | Carnobel | Stab wound apex; suture. | Death on fifth day, of purulent pleurisy. |
| 42 | Williams | Stab wound, left ventricle, non-penetrating; suture. | Recovery. |
| 43 | Walker | Eight wounds in anterior wall of left ventricle; eleven sutures. | Death on following day. |
| 44 | Walker | Wound in the tip of right ventricle. | Death in half an hour from hemorrhage. |
| 45 | Maselli | Stab wound of left ventricle; suture. | Recovery. |
| 46 | Pagenstecher | Stab wound of the region of heart; exposure of heart according to Ninni's method; ligature of left coronary artery; drainage of pericardium. | Death on fifth day from purulent pericarditis and pleurisy. |
| 47 | Ninni | Stab wound right breast and pleura, wound $2\frac{1}{2}$ cm. long of right ventricle; suture. | Death on fourth day, the result of septic pleurisy. |
| 48 | Maselli | Stab wound of right ventricle; suture. | Death several hours later as a consequence of hemorrhage. |
| 49 | Wolff (1901) | Stab wound 4 cm. above the tip of right ventricle; wound sutured. | Patient died fourth day after operation from bilateral pleurisy. |
| 50 | Wolff (1901) | Stab wound $\frac{1}{2}$ cm. behind left ventricle; suture. | Recovery. |
| 51 | Wolff (1902) | Angular wound of the margin between the right artery and ventricle; five sutures; operation lasted one hour. | Recovery. |
| 52 | Schwerin (1908) | Punctured wound of right cardiac auricle. | Recovery. |
| 53 | Milesi | Right ventricle. | Died twenty-four hours later. |
| 54 | Giordana | Stab wound of left ventricle. | Patient died an hour and a half after operation. |
| 55 | Giordana | Wound of left ventricle. | Recovery. |
| 56 | McArdle | Stab wound of left ventricle. | Recovery. |
| 57 | Noll | Gunshot wound of left ventricle. | Recovery. |
| 58 | Barth | Right ventricle. | Death on fourth day from pericarditis and bilateral pleurisy. |
| 59 | Barth | Left ventricle. | Recovery. |
| 60 | Barth | Left ventricle. | Recovery. |

SUMMARY.

| | | |
|---------------------------------|----|--------------|
| Total number of cases | 60 | |
| Number of deaths | 35 | = 58 per ct. |
| Number of recoveries | 25 | = 42 " |

Causes of death included hemorrhage, bronchopneumonia, pericarditis, anæmia, empyema (abscesses of lung), perforation of ventricle, infection, sepsis, degeneration of heart muscle, pneumothorax, purulent pleurisy, and purulent pericarditis.

Of all the cases the following is a table of place injured :

| | | Died. | Recovered. | Mortality. | Recovered. |
|---------------------------|----|-------|------------|------------|------------|
| Right ventricle | 20 | 14 | 6 | 70 per ct. | 30 per ct. |
| Left ventricle | 31 | 14 | 17 | 45 " | 55 " |
| Right auricle | 2 | 1 | 1 | 50 " | 50 " |
| Left auricle | 0 | | | | |
| Apex | 2 | 1 | 1 | 50 " | 50 " |
| Coronary artery | 1 | 1 | | | |
| Not stated | 5 | 4 | 1 | 80 " | 20 " |

As to the *indications* for operation Wolff holds that in the case of gunshot wounds the expectant treatment should be carried out, inasmuch as many cases are known to have recovered spontaneously. The absolute indications for operation after punctured wounds, according to Wolff, are severe primary hemorrhage and oppression of the heart action from the accumulation of blood within the pericardium. Secondary hemorrhages may, of course, constitute another indication; it comes on usually after the patient is reacting from primary syncope, when the blood pressure increases and dislodges the clot, although it may occur later—*e. g.*, when the patient first gets up. Terrier and Raymond described such a case in which the patient upon his first effort immediately collapsed. The cicatrices at first are not very strong, and if they yield will give rise to aneurysmal formations, which have been known to rupture and to be followed by fatal hemorrhage. Intervention may be necessary and successful even in the absence of an external wound, as in the case of a young man kicked in the breast. Unconsciousness persisted, and the heart dulness continued to increase. An exploratory incision found the pericardium filled with blood, although hemorrhage from the heart had ceased. The pericardium was evacuated and the patient made a perfect recovery.

The *diagnosis* is not always a simple matter, because the injury to the heart is so often complicated with an injury to the pleura. The apparent increase in cardiac dulness may be due to hemorrhage into the pleural cavity. Further difficulties arise from the variation in the gravity of the symptoms. In some cases the patient suffers no serious effects from the penetration of the organ, while in others the most alarming symptoms develop almost immediately after the injury. The only signs, which may be regarded as absolutely pathognomonic, are the

peculiar splashing sound heard over the pericardium, indicative of the presence of blood not under pressure and a whizzing sound due to the presence of air within the pericardial sac.

Technique. Barth is opposed to the adoption of any definite plan of preliminary operation for exposure of the wounded heart. He believes it a waste of time to attempt to avoid the pleura, as this structure is generally wounded. In cases of suspected wounding of the heart Barth enlarges and follows up the external wound, and is then guided by circumstances ; in one case he found it necessary to resect only a piece of one rib, while in another he made an osteoplastic resection of the whole width of the sternum. Zoll holds very much the same opinion ; any rules for a definite and typical operation in cases of cardiac injury are, he says, quite unnecessary ; the resection of one, two or, at the most, three ribs will permit a sufficient exposure of the heart. Extensive resection of the sternum, on account of the risk of bilateral pneumothorax, are objectionable.

Elsberg recommends that the suture should be tied in diastole, because there is more risk of the suture cutting through if tied in systole ; but Sherman concluded from his experiments that it was a matter of little or no consequence whether the wound was tied in systole or diastole. As a matter of fact, in many cases it will be practically impossible to tie the knot intentionally either in diastole or systole, because of the rapid action of the heart. It is still a disputed question whether the incision in the pericardium should at once be completely closed or be left open for the purpose of drainage. According to Barth, the great disadvantage of drainage is the adhesions which will form between the pericardium and heart. And yet, since infection is a very common complication, and one responsible for many deaths, drainage should be introduced when from the nature of the injury the wound is likely to have been infected. Studying the records of his tabulated series of thirty-nine cases Wolff concludes : 1. That operation is justifiable when there is but a suspicion of a cardiac wound, in order to guard against the possible development of cardiac aneurysms. The treatment of gunshot wounds should be, as a rule, expectant. 2. That the only method of establishing a positive diagnosis is exploratory operation. 3. That the extra pleural method of exposing the heart is seldom possible, since the pleura almost invariably is wounded. 4. That the button suture has proven the most efficacious ; sutures should not include the endocardium. 5. That the wound in the pericardial sac should be closed without drainage unless there are such positive indications for tamponing, as infection or uncontrollable hemorrhage.

THE THORACIC WALL.

Post-typhoidal Infection of the Ribs. One of the peculiar features of typhoidal infection of the osseous system is the length of time that may elapse between the original attack and the subsequent metastatic lesion. Months and years may pass before the complication develops. Another feature peculiar to typhoidal bone infection is the length of time (in one instance six years) in which the discharge from the sinus will show a pure culture. These features are common to typhoidal lesions in any of the bones, but Horsley¹ points out five peculiarities that appear to differentiate post-typhoidal disease of the ribs from a similar lesion of other bones: 1. The marrow of ribs seems to be a particularly favorite seat of the bacillus in a patient convalescing from typhoid. 2. The superficial position of the ribs, their movement in respiration, their subjection to constant impact from the heart's action, these combine to make a *locus minoris resistentiæ*. 3. Necrosis occurs less frequently in the ribs than in the other bones. 4. Post-typhoidal infection occurs chiefly in later life (thirty-one to sixty-three years). 5. There is greater difficulty in performing a thorough operation, because in typhoid lesions, unlike those secondary to empyema or pneumonia, the pleura is not thickened; consequently it is very readily injured. In addition to these characteristic features there is little, if any, constitutional disturbance. From an analysis of a table of forty-eight cases Horsley points out the salient clinical manifestations. As to the sex, forty out of forty-seven occurred in males. In all cases the disease occurred in adults; the youngest patient was nineteen years, the oldest sixty-nine years. The first, third, fourth, fifth, sixth, seventh, eighth, ninth, and twelfth ribs, twenty-one cases in the right and fifteen in the left. The nature of the lesion, according to the reports, varied; some were described as periostitis, some osteomyelitis, necrosis, caries, chondritis, and perichondritis. The prognosis is not, as one might think, invariably good; intelligent and persistent treatment is required to ensure complete recovery.

An Enormous Tumor of the Thoracic Wall. Unusual interest is attached to the case reported by Purv,² because of the size of the tumor. The tumor, an enchondroma, with more or less sarcomatous admixture, measured thirty-three inches in circumference, weight fifteen pounds, and was attached to the ribs, pleura, and diaphragm. At least a third of the growth occupied the pleural cavity. After the tumor was removed the whole pleural cavity and the pulsating pericar-

¹ *Annals of Surgery*, February, 1903.

² *Ibid.*, May, 1903.

dial sac were exposed to view. The lung was completely collapsed. With the exception of occasional attacks of dyspnoea and rapid pulse, there were no postoperative complications. Two years after the operation there had been no recurrence and no hernia. (No precautions seem to have been taken in this case to guard against the shock attending sudden collapse of the lung, the complication most to be dreaded in these cases. The use of one of the more modern appliances for artificial respiration is to be recommended in operations of this nature, as it will prevent sudden collapse of the lung, and will ensure the maintenance of respiration after the pleural cavity has been opened.)

Drainage of Empyemata. On the assumption that tubular drainage, acting as a mechanical irritant, is of itself directly responsible for the continuance of the purulent secretion, and because of the possibility of the tube being lost in the pleural cavity, Brinkman¹ recommends a method in which the tube is dispensed with and continuous drainage ensured by suturing the edges of the skin to the edge of the pleura. This method offers a large and free outlet for the secretion, and the period of convalescence is, he claims, very much shorter. In twenty-two cases the period of convalescence varied from three weeks to five months. When the period of discharge is of short duration it will be necessary to freshen the edges of the wound in order to promote union.

TREATMENT BY CONTINUOUS ASPIRATION. Van Hook² advocates the plan of irrigation as suggested by Perthes, which consists in making an adequate opening, resecting the rib if necessary, and then maintaining continuous pressure, less than that of the atmosphere, in the pleural cavity, so that the lung may be enabled to expand more rapidly. In all recent cases Perthes claims that the lung will be distended in a few days, although the secretion diminishes only gradually, and the closure of the cavity remaining, after removal of the drain, requires considerable time. This is explained by assuming that a certain time is required until the pneumococci or streptococci embodied in the superficial layers of the pleura die.

RESECTION OF THE SCAPULA FOR THE TREATMENT OF CHRONIC EMPYEMATA. It is often necessary in order to effect a cure of long standing empyemata to do more than excise the ribs, as in the Schede operation. In many cases it is necessary to excise the scapula as well, and in the three cases reported by Ringel³ the procedure was resorted to with gratifying results. Among the advantages of removing the scapula, it may be said that it enables the musculocutaneous flap to collapse and obliterate those cavities which extend above the fifth rib.

¹ Pennsylvania Medical Journal, January, 1903.

² Journal of the American Medical Association, May 30, 1903.

³ Archiv für klinische Chirurgie, Bd. lxxi., Heft 1.

To be sure the arm will, to a certain extent, be incapacitated, but this is of minor consideration as compared with the gravity of the lesion to which the procedure is recommended. By many tuberculous pleurisy is regarded as a contraindication, but two of the cases reported which recovered from the operation were tuberculous in origin. If the patient's general condition is unfavorable for a complete resection the operation may be done in sections. A contraindication to the operation, however, is the involvement of the lung on the opposite side with the tuberculous process; the patient must have, at least, one sound unencumbered lung to warrant such an operative procedure.

In discussing the question at the Thirty-third Congress of the German Surgical Society, Jordan, of Heidelberg, expressed himself as favoring the combined Schede and Delorme operation, but objecting to the resection of the scapula, because of the disability that would follow. Rehn, of Frankfort, has seen cerebral embolism and bronchial fistula follow Delorme's operation. Perthes first fills the cavity with fluid in order to determine its dimensions; if the walls of the cavity come together when suction is applied operation is contraindicated.

Experimental Production of Pleural Adhesions. Karewski¹ concludes from his experiments upon animals that in addition to bringing the lung and pleura into apposition with one another by means of a suture, a chemical irritation was necessary to produce rapidly adhesions firm enough to make it possible to reach the lung without infecting the pleural cavity. He uses turpentine as a chemical irritant, and introduces a crown suture of silk. After three days the adhesions are firm.

Hydatid of the Pleura. There was no means of determining what was the nature of the lesion before the operation, but from the physical signs there was reason to believe it was not a new-growth nor a lesion of an inflammatory nature. Hydatid cyst was considered a possibility. Willis² made an incision four inches long, the centre of which corresponded with the second intercostal space in the midclavicular line. With an exploratory syringe a perfectly clear fluid was withdrawn, the opening was enlarged, and a cavity discovered occupying the whole apex of the thorax, with apparently no communication with the lung. In the course of ten days the whole of the cyst wall was expelled through the opening. In the course of time the lung expanded somewhat and partially obliterated the cavity; but complete obliteration of the cavity will not occur until a portion of the chest wall is resected. The sinus is still discharging a thin seropurulent fluid. The patient gained weight, the cough ceased, and in every way improvement was decided.

¹ *Centralblatt für Chirurgie*, No. 7, 1903.

² *British Medical Journal*, February 7, 1903.

Endothelioma of the Pleura. Delamour¹ discovered in a woman, aged thirty-eight years, that there were physical signs of a lesion of the right pleura. There had been little expectoration, marked dyspnoea, and a decided loss of flesh and strength. On introducing an aspirating needle, at intervals of a week or more, thirty-two, forty-four, sixty-four, and fifty-six fluidounces, respectively, of either a bright-colored or a brownish serum, were withdrawn. Upon examination of the fluid Biggs reported it as a probable case of primary endothelioma of the pleura.

Gunshot Wound of the Thorax. In a paper presented to the Section of Surgery of the American Medical Association, Rodman² deals with the most important principles involved in the diagnosis, prognosis and treatment of gunshot wounds of the thorax, from the viewpoint of the civil surgeon. The *diagnosis* of penetration of the lung alone is, as a rule, not difficult; shock, hæmoptysis, external hemorrhage, and emphysema, local, general or both, are usually present, although in some cases it is surprising how few symptoms may be present in balls of small calibre. External hemorrhage and hæmothorax, while significant of penetration, are nearly always of parietal and not of visceral source. As to the *prognosis*, contrary to the teaching of most of the standard text-books, Rodman states that in civil life the injured either die at once from shock and hemorrhage or very generally get well. The subsequent complications, such as empyema, pyothorax, pneumonia, and abscess, are exceptional, and are usually due to meddlesome surgery, such as probing either with instruments or unsterile fingers. The *treatment* for shot wounds of the chest should, as a rule, be a "masterly inactivity;" absolute rest, cooling drinks, a little opium, and sterile immobilizing dressing constitute the only treatment necessary in the majority of cases. *Pressure may be relieved by aspiration* and hemorrhage controlled by strapping. Any attempt to recover a ball would be fraught with danger and is rarely justifiable, as the bullet will continue to be harmless unless it has carried a septic material.

Koenig³ makes some aphoristic remarks on the course and treatment of shot wounds of the lung, more particularly those due to revolver wounds in attempted suicide or murder. In most of these the bullet is discharged at short range and the pleura and lung are penetrated. The commonest complications are emphysema, pneumothorax, and hemorrhage; the latter is almost constantly met with. Rarely is the hemorrhage so profuse as to be rapidly fatal; in the majority of cases it continues until the second day, causing pressure symptoms, but from then on, as the blood is absorbed, the signs of respiratory distress subside. In some

¹ Brooklyn Medical Journal, April, 1903.

² Journal of the American Medical Association, February 14, 1903.

³ Berliner klinische Wochenschrift, August 10, 1903.

instances absorption is so slow that it is advisable to evacuate the effusion. According to the clinical course cases of shot wounds of the thorax may be classified as follows: 1. In which the injury is so great and the hemorrhage is so great that in a few hours the injured dies from pressure and hemorrhage. 2. The symptoms of shock, grave at first, become less serious, but the disturbances of respiration gradually increase in severity until the second or third day, and may even then cause death, but, as a rule, the subjective phenomenon gradually disappear, and there remains only a few objective signs, such as fulness and bronchial breathing. 3. There is a period of very long duration, during which resorption is going on; weeks and even months go by before the dulness and subjective symptoms entirely disappear. The treatment of these cases depends upon individual circumstances. In general, it may be said that only rarely is one justified in operating within a short time after the accident for the purpose of arresting hemorrhage. If two or three days after the injury the phenomena (respiratory distress, frequency of pulse, and elevation of temperature) increase, one should not hesitate to perform a thoracotomy. A rise of temperature and difficult breathing appearing at a later stage suggest infection, and constitute another indication for operation. In order to avoid the possibility of infection in a hæmothorax an operation should be performed, but under the strictest aseptic precautions; otherwise a hæmothorax may be converted into an empyema. When the resorption is slow one may remove the blood by puncture, and only when this proves unavailing is a thoracotomy justifiable.

Pulmonary Abscess. One of the few indications for operation upon the lungs is the presence of an abscess, and that only in certain selected cases. Karewski,¹ who has earned the reputation of a specialist in lung surgery, takes a very conservative position as to the propriety of surgical measures in the treatment of many pulmonary abscesses. In the first place, accurate localization is a *sine qua non*; secondly, one must take into consideration that a number of abscesses are not at all suitable for operation; and, thirdly, a large number of abscesses heal spontaneously. Among those especially unsuited for operation are the abscesses secondary to an influenza pneumonia; the lesions are multiple, and do not communicate between the various abscesses so as to afford drainage; the prognosis would be more favorable, although the convalescence may be protracted. In the chronic lung abscess of advanced age operation is rarely required, and the same is true of those due to foreign bodies. Although the latter would seem to be favorable, for intervention experience has taught us that the foreign body is rarely found,

¹ Münchener medicinische Wochenschrift, Nos. 39 and 40, 1903.

and the chances of recovery from the operation are not bright. On the other hand, abscesses of this kind have been known to heal spontaneously when the foreign body is expectorated. Every attempt should be made to remove the foreign body through the bronchi. Perhaps the most favorable group of cases is that in which the pulmonary abscess is secondary to one of an adjacent organ—*e. g.*, perinephritic, hepatic, and subphrenic abscesses, and those secondary to Pott's disease. The abscess is single, often situated near the surface, and unless it evacuates itself spontaneously, by breaking into a bronchus, pneumotomy should be performed, and the possibility of metastatic infection thereby reduced to a minimum.

The prognosis will depend upon a great many circumstances. In the first place, the prognosis will depend upon whether the abscess is acute or chronic; the former constitute a much more favorable class. In the latter there are often multiple foci, with walls so dense and unyielding as to counteract any tendency to repair of the cavity after the operation. The age of the patient, inasmuch as it concerns the condition of the ribs, is an important factor. The ribs of young people are more elastic and yielding; they can adapt themselves more readily to the changed condition within the lungs. Then, again, the relation of the abscess to the bronchus will affect the outcome; if the abscess is so situated that the secretion flows easily into a bronchus the possibility of expectoration is greater; so, too, an apical abscess will heal more readily than a basal one, since drainage is more perfect, both by way of the bronchi and the drainage-tube. Since the base of the chest is more movable, abscesses of the lower lobe may be more thoroughly evacuated by coughing, and the defect more readily repaired by granulation and cicatrization.

The surgeon has a right to expect spontaneous recovery, and, therefore, to practise expectant treatment (1) in young individuals; (2) with small apical foci; or (3) with larger recent basal foci. In many cases the process shows a tendency to extend not only toward the bronchi but toward the surface of the lung, so that many empyemata have been caused by the pulmonary lesion; but operation should not be postponed until the pleura has become infected and pleural adhesions formed. If at a preliminary operation the edges of the pleura are united with silk saturated in turpentine, there will be no danger of causing an empyema. In general, it may be said that the earlier the operation the better will be the prognosis.

Gangrene of the Lung. The diagnosis of the case of gangrene of the lung reported by Riesman, Wood, and Pfahler¹ could have been made by the physical signs, but a skiagraph which was taken furnished

¹ American Journal of the Medical Sciences, June, 1903.

additional and confirmatory evidence. In some instances the physical signs are misleading, and it is in these cases that the x-ray gives invaluable service. When the skiagraph findings do not coincide with the results of auscultation and percussion, according to Tuffier, they should be ignored and the operation performed according to the evidence furnished by the physical signs. The importance of definitely locating a lesion of the lung before undertaking any operative procedure will appeal to everyone. The resection of the ribs and pleural opening should be ample in cases of pulmonary gangrene, more so than in cases of abscess of the lung, since the healing process is slower, and it is necessary to keep the external opening patulous until the cavity is entirely closed. The advisability of securing an adhesion between the parietal and visceral layers of the pleura, if adhesions do not already exist, need only be mentioned. After the cavity is exposed the contents should be removed by carefully sponging or swabbing, and not by irrigation. The percentage of recoveries in operations for gangrene of the lung is in the neighborhood of 65 per cent., whereas without operation but 20 or 25 per cent. recover. The case which was operated upon by Wood eventually recovered, although the convalescence was somewhat protracted.

INFECTIOUS DISEASES, INCLUDING ACUTE RHEUMATISM, CROUPOUS PNEUMONIA, AND INFLUENZA.

By ROBERT B. PREBLE, M.D.

SINCE the appearance of the last article upon infectious diseases much satisfactory work has been done, and while the results are none of them epoch-making they mark an advance. Certain questions have, as is usual, received very thorough discussion, while others have received but little. The questions most vigorously studied have been the unity or duality of human and bovine tuberculosis, the relation of cholera nostras, and sporadic dysentery to the Shiga-Flexner bacillus, and the nature and frequency of paratyphoid infection. Typhoid fever has as always been vigorously studied, and some new things, particularly in the line of specific treatment, have been developed. Methods of the diffusion of typhoid fever have been worked over, and, while nothing absolutely new has been discovered, much has been done in the way of confirming and extending previous results. Scarlet fever and the relations of the streptococci to it have been much discussed, and opinions are still at variance. Tetanus, and particularly its treatment, has been the subject of many articles, and it must be admitted that the subject is still chaotic and the results very contradictory. There have been a number of excellent articles upon the bacteriology of acute rheumatism, now universally admitted to be an infectious disease. Pneumonia also has received its share of attention, but the most important result of the work has been a growing appreciation of the value of the bacteriological study of the blood. The same thing is true of the study of the blood in other infectious diseases.

It will be noted that certain diseases are considered this year for the first time. In view of our extending interests in the world, it becomes necessary for the American medical profession to turn their attention to diseases which formerly were not considered within their field, and it has been thought wise to devote a little space to a consideration of the progress made in the study of the tropical diseases. Much interesting work is being done in this field, and it is well to keep pace with it.

Before taking up a consideration of the various diseases individually some note should be made of the growing importance of the gross animal parasites in the diffusion of infectious diseases. The relation of the *mosquito* to the spread of malaria and yellow fever is now generally admitted, and needs no further discussion here. The importance of this discovery is well illustrated in an article by Gorgas,¹ in which he gives an account of the methods employed in freeing Havana of *yellow fever*. The fundamental idea in the work was the destruction of all infected *stegomyia*, the prevention of the infection of other *stegomyia*, and, lastly, the destruction of all mosquito larvæ. The rooms in which infected mosquitoes were found were fumigated by burning pyrethrum powder. All patients suffering from yellow fever were kept constantly screened in order to prevent the infection of the mosquitoes, and, lastly, all breeding places for mosquitoes were destroyed or protected by screening. All cesspools and marshes were covered with petroleum once each month. The truly marvellous results of this work are known to all, but will be taken up somewhat in detail in the paragraph on yellow fever.

During the year one other disease has been proven to be transmitted by the bite of the mosquito. Graham² reports a careful and most painstaking study of an epidemic of *dengue*, which he was able to show was carried to the patient by the *culex fatigans*, the common mosquito in Beyrouth, where the cases occurred.

Next in importance to the mosquito as a carrier of disease is the common house-fly. Alice Hamilton³ reports her study upon the fly as a distributor of *typhoid fever*. Her work was done in connection with the study of an epidemic of typhoid fever in the so-called Hull House district in Chicago. This is a neighborhood of extreme poverty, thickly crowded with the poorest grade of foreigners, containing one-thirty-sixth of the population of the city, yet yielding one-seventh of the deaths from typhoid fever.

After a detailed consideration of the water supply and sewage conditions, well illustrated by maps of the region, she reports upon a bacteriological study of the common house-fly caught in privy vault, yard, and kitchen (used also as a bedroom) of a house in which there were two cases of typhoid fever. In all eighteen tubes were inoculated, and in five of these typhoid bacilli were found.

The significance of this study is very great, and must convince anyone of the possibility of this mode of transmission of typhoid fever. It appears to me probable that this method of spread of typhoid

¹ Medical News, January 3, 1903.

² Journal of Tropical Medicine, 1903, p. 209.

³ Journal of the American Medical Association, February 28, 1903.

fever is far more important than has been previously supposed. The importance of this method of transmission is still further increased by the work of Fischer,¹ who has particularly studied the length of life of typhoid bacilli in or on the bodies of flies. He found that flies fed with typhoid bacilli were able to convey the microbe to objects with which they came in contact twenty-three days after the feeding. Inasmuch as the flies can, under natural conditions, acquire the bacilli from the excreta of typhoid patients, these studies simply add one more reason for the careful sterilization of typhoid excreta—urine as well as feces. Were this done systematically and thoroughly in all cases of typhoid fever this disease would disappear as an epidemic disease.

There is no good reason for questioning the probability that flies carry other diseases as well as typhoid, and are with them, as with typhoid, such important factors in the spread of disease that they should receive serious attention in combating infectious disease.

In this connection Küster's² interesting article reviewing experimental studies upon the transference of infectious material by insects, particularly flies, might be quoted. Flies are known to carry typhoid, cholera, tubercle, anthrax, and plague bacilli, as well as the various pyogenic cocci. The bacteria may be carried either on the surface of the insect or in its intestinal tract, when they are deposited in the feces of the fly. If Fischer's figures of twenty-three days are correct for other bacteria as well as for the typhoid bacilli, the fly becomes an important object of study in all the diseases mentioned, and, probably, in others also. Not only do flies carry infectious organisms, but mosquitoes, bedbugs, ants, fleas, and cockroaches do also, both in and on their bodies. Flies fed on tuberculous sputum develop a diarrhœa, but bedbugs, cockroaches, and fleas are not affected when fed on anthrax, mouse septicæmia, or chicken-cholera organisms. Flies die when fed on pest bacilli, but fleas, mosquitoes, bedbugs, ants, and cockroaches are not affected.

In regard to the question as to whether insects do actually become sources of infection, under natural as well as laboratory conditions, Küster quotes numerous authors and observations. Tavel reports a staphylococcus abscess from the bite of a gnat. I may interpolate here that I have seen a staphylococcus abscess follow a bedbug-bite. Tikine records a case of relapsing fever from a bedbug-bite. Kaposi has seen leprosy follow mosquito-bites. Boeck reports leprosy after scabies. Dewewre records tuberculosis after an ant-bite, and Andrew

¹ Arch. f. Hygiene, 1903, p. 274.

² Centralblatt f. Bakteriologie, Parasitenkunde, 1903, 90.

MacKaig has seen cholera transferred by flies. Numerous authors have recorded instances of typhoid spread by flies, and Simond's theory that the bubonic plague is spread from rats to man by the rat-flea is receiving more and more general acceptance.

Gauthier and Rayband¹ report some most interesting and important experiments made in an effort to test the validity of Simond's theory mentioned in the preceding paragraph. The experimenters took fleas from the bodies of healthy rats and placed them upon the bodies of plague-infected rats, and then again upon healthy rats. Five such experiments were successful in transferring the disease. Experiments in which the small acarus, which is a common parasite on rats, was used in place of the flea, were unsuccessful. Simple cohabitation of infected and non-infected rats did not cause transmission of the disease. It has been stated that the rat-flea would not bite man, but experiments performed to determine this point were positive in fourteen of sixteen made. The common rat-flea was found to be the *pulex fasciatus*.

These experiments must be regarded as a confirmation of the opinion formed by the Health Board of Sydney, Australia, during its last experience with the plague, as reported by Lydston.² The Sydney authorities became convinced that the only common way in which the human acquires the plague is through the bite of the rat-flea, which they, like Gauthier and Rayband, found to be the *pulex fasciatus*. Acting upon this theory they were able to control the epidemic more quickly and with less hardship to the people than otherwise. They did not, for example, find it necessary to quarantine the contacts. In regard to the current idea that the rat-flea will not bite the human, they say that while it may not do so elsewhere in the world it certainly does in Sydney, and in view of the experimental studies just recorded it must be believed that they do elsewhere as well as in Sydney.

There are still two other insects which must be mentioned in this connection—the *tick* and the *tsetse fly*. No mention has yet been made in PROGRESSIVE MEDICINE of the very interesting studies of Wilson and Chowning³ of *mountain fever* in Montana. These authors believe that they have discovered the cause of this mysterious disease in a protozoa, inhabiting the red blood corpuscles, and closely resembling the protozoa of Texas fever, and, like it, probably entering through the bite of the tick. Their report will be more fully detailed in a special paragraph. The *tsetse fly* has very recently become of interest, because of the discovery by Castellani of the probable cause of the

¹ Comp.-rend. de la soc. biologie, 1902, 1497.

² New York Medical Journal, February 28, 1903.

³ Journal of the American Medical Association, 1902, ii. 131.

sleeping sickness. Castellani believes this disease due to a *trypanosoma*. The trypanosoma, which is the cause of several important diseases of the lower animals, particularly of the horse, is generally believed to enter its host through the bite of the tsetse fly, and in regions in which the sleeping sickness is found the tsetse fly is common.

Reviewing, then, these reports we find that the mosquito, the house-fly, the rat-flea, the tick, and the tsetse fly are all with justice, and some of them with certainty, to be regarded as important factors in the transmission of a number of the most important diseases: typhoid, malaria, yellow fever, cholera, plague, mountain fever, sleeping sickness, dengue, and very probably, also, tuberculosis. These discoveries seem to me to be most important from the standpoint of preventive medicine. These pests are all sufficiently large to be visible, and are, therefore, more easily guarded against than microscopic parasites. Furthermore, many, certainly the ones in which we personally are most concerned, the mosquito and house-fly, are largely due to unsanitary conditions, and are to be greatly lessened or destroyed by the correction of these conditions. By the destruction of these pests, and by the prevention of the infection of such as escape destruction, many of the most serious epidemic diseases can be stamped out. Neither of these requirements are impossible of attainment; they can scarcely be considered as extremely difficult. That they are not fulfilled is due to the carelessness and apathy of those who should be most concerned.

Dengue. THE MOSQUITO A CAUSE OF DENGUE. Although dengue is not a disease of great interest to the bulk of American practitioners, the report by Graham¹ of an epidemic of dengue is so careful and so interesting that his article is given more attention than would, perhaps, seem warranted. His studies are based upon 500 cases in Beyrouth. Experience in this and other epidemics has led Graham to the opinion that in the mosquito was to be found the factor which made dengue appear at times as a highly contagious disease in certain localities, while it was not at all so in others. In Beyrouth no one of the forms of anopheles are to be found, and the common mosquito is the *Culex fatigans*.

Early in the epidemic Graham began a series of experiments to determine, if possible, whether this form of mosquito was capable of carrying the dengue from person to person. The first experiment was done with a mother and nursing child. The day the mother was taken with the initial chill she and the child were placed in a room in which all the mosquitoes had been previously killed by fumigation with chlorine gas. Each day afterward the mother and child were taken to

¹ Journal of Tropical Medicine, 1903, 209.

a freshly fumigated room, three rooms being given up to this purpose, each fumigated after its day of occupancy, and at all times protected from re-entrance of mosquitoes. The mother nursed the child during the entire course of the rather severe attack of dengue, but the latter was not infected. Other experiments of the same sort were carried out, and in each instance with complete success. The experiments are not numerous and have only a negative value as evidence, but they are interesting and strongly suggestive.

Direct inoculation experiments were performed in the following manner: Four men, from a house in which there had been no case of dengue, were selected, and night after night slept under netting in which had been placed mosquitoes taken from the netting of patients suffering from dengue. In one case the initial chill came on five days after the mosquitoes were put under the netting; in a second, six days after; and in a third, four days after. In the fourth case no attack of dengue developed. This patient had had a typical and severe attack of dengue in 1899.

Because of the possibility of these patients, all living in a highly infected neighborhood, having been infected elsewhere in some other way than by the mosquitoes to which they had been deliberately exposed, Graham took mosquitoes from the netting of dengue cases and carried them to a mountain town 3000 feet above the sea-level, where there were almost no mosquitoes, and in which there had been no cases of dengue. Two young men were exposed to the bite of the imported, infected mosquitoes, and both developed severe and typical attacks of dengue, one in four and the other in five days. The infected mosquitoes were killed before having any chance to bite anyone else, and no other cases of dengue developed in the village.

THE ORGANISM OF DENGUE. Blood examinations were made in over 100 cases, choosing for examination only cases in which the attack was typical and severe. In all cases an organism was found which in many ways resembled the plasmodium of malaria, but it is smaller and contains no pigment. Effort was made to follow the stages of development, but this was difficult because of the slowness with which the changes occurred, and could be done only by using a series of blood preparations rather than one. The organism is not so easily shown as the malarial parasite, but is readily demonstrated by anyone accustomed to looking for the plasmodium malariae.

Experiments were also made with a view of discovering the changes undergone by the organism within the body of the mosquito, but, while they grew more rapidly in the stomach of the mosquito than in the circulating human blood, changes similar to those characterizing the evolution of the plasmodium could not be demonstrated. Examination

of the salivary glands showed spores within forty-eight hours—a much shorter period than that required by the plasmodium.

An attempt was made to inoculate individuals with the salivary glands. These were laboriously dissected out as well as possible, and thoroughly mixed with warm, sterilized, normal salt solution with pepsin. This solution was prepared from a mosquito with a twenty-seven-day-old infection, and injected under the skin of the patient. The patient had a chill and fever beginning on the third day, resembling in every way that of dengue, but so severe that no further experiments of this sort were attempted. The blood of the patient showed the dengue organism in the blood.

It is to be hoped that the men who are engaged in practice in parts of this country where dengue occurs will repeat these studies of Graham and confirm or correct them. If correct they make an important addition to the science of preventive medicine, and must be ranked with the important events of medical sciences.

Diphtheria. ANTITOXIN. This disease, which is the most completely worked out of the acute infectious diseases, has been the subject of a very considerable amount of literature during the current year, most of it being in the way of confirmation of already well-established facts. There are still a few authors who contend against the therapeutic value of the diphtheria antitoxin, just as there are people who still argue that the world is flat. There have been some suggestions in regard to the use of antitoxin which seem to me of value, just as there have appeared a number of articles upon certain aspects of this disease which deserve citation.

Philips¹ reports upon 7319 cases of diphtheria, treated in twenty-seven different hospitals scattered all over Great Britain, with a mortality of but 12.6 per cent. When one considers that these are all hospital cases, which means that there are included many cases which would be of more than ordinary severity, and many others which would not receive treatment until late in the disease, the results are the more surprising. The mortality is in marked contrast with that of the seven years preceding the introduction of the antitoxin, namely, 35 per cent. The same facts are shown by Pulawski.² He contrasts his cases in private practice before and after the introduction of the antitoxin; 546 cases without antitoxin gave a mortality of 60 per cent., while 469 cases with antitoxin gave a mortality of but 7 per cent.

Figures collected at random from American sources, covering in all

¹ British Medical Journal, August 8, 1903.

² Deutsche med. Wochenschrift, 1903, 506.

10,276 cases, yielded percentages almost exactly like those quoted above from Philips; 2853 cases treated by the old methods gave a mortality of 34.03 per cent., while 7423 cases treated with antitoxin showed a mortality of 13.2 per cent.

Louis Cairns¹ expresses the hope that the mortality of diphtheria may be still further reduced by the use of larger doses than those now commonly employed, and I am personally strongly convinced that this is certain. The general practitioner, seeing only the limited number of cases falling to the lot of each, is prone to put off the use of the serum until he has tried the older methods, and reserve the antitoxin until the last resort. It should be the first and not the last resort. Another common error is to use a smaller dose for a small child than would be used for a large one. The smaller the child, the larger the dose should be.

The intravenous administration of antitoxin, as advocated by Cairns, in cases of malignant diphtheria has been mentioned in *PROGRESSIVE MEDICINE* for December, 1903.

Mongour² reports some instances in which he has used *intravenous injections of antitoxin*. The first case is that of a child, aged nine years, seen first on the third day, when he showed great difficulty in deglutition, ashy color, fetid breath, spontaneous vomiting, pulse between 45 and 50, arrhythmia, Cheyne-Stokes respiration, and such great swelling of the lymph glands of the neck as to prevent opening the jaws; 20 c.c. of serum were injected into the veins at 10 A.M. At 7 P.M. there was considerably less swelling of the glands of the neck, the pulse was 70, but the Cheyne-Stokes breathing and the vomiting continued; 20 c.c. of serum were again given intravenously. The next morning the vomiting had ceased, the pulse was 70, the breathing was regular, and there was almost no swelling of the glands. The mouth, which could now be opened, showed a membrane covering the tonsils and palate. The patient made a good recovery.

A second case equally bad with early bulbar symptoms received 90 c.c. of serum intravenously and 20 c.c. subcutaneously, and recovered. Mongour believes that the intravenous injections are safe, that they do not cause an early albuminuria, that they cause a very rapid lessening and disappearance of the bulbar symptoms and the swelling of the cervical lymph glands, but that they do not cause the membrane to disappear any more quickly than the subcutaneous injections do.

In connection with these results some note of the experience in the Children's Hospital of Basel, as reported by Karger,³ will be inter-

¹ *Lancet*, December 20, 1902.

² *Gazette hebdomadaire des sciences médicales de Bordeaux*, 1903, No. 11, 132.

³ *Jahrbuch f. Kinderheilkunde*, N. F., Band lviii.

esting. Here it was noted that there was a certain group of cases in which the antitoxin did not have the expected effect. The best results were obtained in the cases in which the intoxication took place slowly, while in cases where the toxic symptoms developed very rapidly the results were not so favorable unless the injection was given very early. The results obtained by Cairns and Mongour lead one to hope that the intravenous injections of the serum will give better results in these justly feared adynamic cases.

The prophylactic value of the antitoxin has never received the attention which it deserves, and it is mainly for this reason that I mention a paper by Josias and Tollemer,¹ reporting the study of the cases of diphtheria in the hospital Bretonneau during the year 1901-1902; 483 persons were immunized and no one of them became sick, although cultures taken from the throat showed the Klebs-Loeffler bacillus in 110.

An eruption followed the use of the antitoxin one hundred and two times. *Urticaria* usually appeared shortly after the injection, while the macules and the erythemata appeared, on an average, thirteen days after the injection.

LENGTH OF ISOLATION IN DIPHTHERIA. One of the most important questions which the practitioner is called upon to settle is when a *convalescent diphtheria* patient may be allowed to mingle with others without danger of spreading the disease. No simple and easy method has as yet been found, and the report of Prip² upon his studies of 100 cases convalescent from diphtheria, in regard to the time of disappearance of the bacilli, does not lead one to hope for an early solution of the problem. Prip examined 100 convalescent patients at weekly intervals, making cultures both from the fauces and the nose. He found the bacilli in 60 per cent. of the cases after their discharge from the hospital. The bacilli would sometimes disappear for from one to three weeks, and then without any apparent reason reappear, to again without reason disappear. They may appear suddenly in the culture taken from the nose, persist for from one to four weeks without causing symptoms, and then disappear.

These studies show how very difficult it is to say when the bacilli disappear, and that the throat and all connecting cavities must be examined for months before it can be definitely stated that the throat is free. Whether such patients are sources of infection to others, and, if so, for how long, could be settled only by a careful and prolonged study of the families in which cases of diphtheria had existed.

¹ *Médecine moderne*, 13, No. 41.

² *Zeitschrift f. Hygiene und Infektionskrankheiten*, Band xxxvi. p. 283.

MIXED INFECTIONS IN DIPHTHERIA. During the year 709 cases with the clinical symptoms of diphtheria were treated, but in only 580 of them was the Klebs-Loeffler bacillus found. In cases of mixed infection—and a mixed infection was considered to exist when the cultures at the end of eighteen to twenty-four hours showed well-marked cultures of the staphylococcus or streptococcus—no distinction could be made clinically between the staphylococcus and the streptococcus infection. They found, as others have, that an added infection is a serious affair, for in 178 cases of pure diphtheria there were 7 deaths, while in 131 cases of mixed infection there were 13 deaths; 153 cases of combined angina and croup yielded 32 deaths, and 45 purely laryngeal cases yielded 10 deaths.

COMPLICATIONS IN DIPHTHERIA. Among the complications may be noted 112 instances of *albuminuria* (whether accompanied with casts or not is not stated); 16 cases of *myocarditis*, with 9 deaths, and 16 cases of *paralysis*, 2 of which were generalized, and both of which died. *Bronchopneumonia* was a frequent complication.

Eppinger¹ makes a report upon *toxic myolysis* of the heart muscle in eighteen cases of *postdiphtheritic paralysis* of the heart, ending, as these cases do, in sudden death. This accident has been known for a very long time, but, while it was a rare event before the introduction of the antitoxin, it has become relatively common since. The probable explanation of this is the same as that of the increased frequency of the postdiphtheritic paralysis since the introduction of the serum, namely, a large number of the cases which now live through until the time for the appearance of these complications formerly died during the active stage of the disease.

A considerable amount of work has been done upon this subject by various authors, and the opinion has been current that the death was due to changes in the nervous mechanism of the heart; but Eppinger is of the opinion that the cardiac paralysis is due to changes in the heart muscle, excited by the diphtheria toxins. In these cases from six to sixteen days after the onset of the diphtheria, which may have been mild or severe, and in from one to ten days after the local membrane has disappeared suddenly, or in many cases after a period of apathy or abnormality in the heart's action, vomiting, collapse, and death suddenly develop.

The autopsy findings are characteristic, and Eppinger has been struck, as others have before him, by their resemblance to those of sudden death due to status lymphaticus; and yet, according to Eppinger, each has peculiar features which should prevent confusion. The

¹ Deutsche med. Wochenschrift, 1903, 257.

heart is large, the walls thinned, the muscle homogeneous, moist, pale gray, rarely yellowish. The organs generally are œdematous.

Boutin¹ has made a careful study of the gastrointestinal disturbances which frequently precede the sudden death occurring during the convalescence from diphtheria. About five or six days after the onset of the angina, but often much later and in the midst of what appears to be a satisfactory convalescence, anorexia, vomiting; sudden, often violent abdominal pain with diarrhœa or constipation appears; then disturbances in the action of the heart, the pulse becoming rapid and feeble; then collapse without dyspnœa, and death.

Boutin dwells particularly upon the anorexia, which is especially profound, and because of its early appearance a valuable sign of threatening danger. Any marked degree of anorexia appearing during convalescence from diphtheria should excite anxiety. Vomiting is an important sign. The child may vomit once or repeatedly, and it may be so persistent as to amount to absolute intolerance of all food. In general the danger is proportionate to the vomiting.

Mounier² draws attention to another form of this series of disturbances. This form is characterized by abdominal crises. After single or repeated emesis an attack of extremely severe pain develops. The pain is not definitely localized. The maximum intensity is in the epigastrium, and the pain radiates to the hypochondrium, the liver, and sometimes to the rectum. Then, as with the gastric type, the pulse becomes rapid and sudden death frequently occurs. All recorded cases of this sort have been fatal. They occur independently of the severity of the diphtheria.

Fournier³ draws attention to another cause of sudden death in diphtheria, namely, cardiac thrombosis, with secondary emboli. It is probable that this cause is of greater importance than has been generally supposed. The formation of the thrombi occurs especially in cases of diphtheria, with an added staphylococcus infection, and usually does not take place until the tenth or twelfth day of the illness. The thrombi forms more often in the right than in the left heart. The clinical symptoms are those which one would naturally expect. Suddenly during convalescence the child becomes cyanosed and dyspnœic, a marked collapse develops, and the child dies in terrible agony. Careful attention may show certain symptoms which serve as danger signals. The heart action becomes arrhythmic or allorhythmic. The pulse becomes small, rapid, irregular, and unequal. Vomiting also is a frequent symptom.

¹ Paris Thesis, 1903.

² *Gazette médicale de Nantes*, 1903.

³ Paris Thesis, 1903.

Aubertin¹ publishes a very interesting report of the study of sixty-five personal observations of *postdiphtheritic paralysis*. Like other authors he finds that age has apparently a marked influence upon the causation of these paralyzes, for they are nearly twice as common in adults as in children; 10 as compared with 19 per cent. This difference is probably more apparent than real. Many adults suffering from diphtheritic angina have so mild an attack that they do not appear for treatment and only the severe cases show up, while the diphtheria is not often overlooked in the child.

Aubertin agrees fully with certain English authors, who hold that there is a relation between the albuminuria and paralysis, so far as the early paralyzes are concerned, both being due to the intense intoxication and usually accompanied by other signs of such intoxication like the cardiac disturbances. There seems, however, to be no relation between the albuminuria and the late paralysis, even when such paralysis is generalized and severe. There seems to be an unquestionable relation between the severity of the diphtheria and the danger of paralysis; so true is this that in certain cases one can predict this complication. Another element which seems to me to be neglected in the estimation of the severity of a diphtheria is the relation between the size of the membrane and the size of the patient. A membrane the size of a quarter is small in the throat of an adult, but it is very large indeed in the throat of a small baby.

Aubertin confirms the idea that there is a relation between the location of the membrane and the distribution of the later paralytic phenomena. He has seen several instances of unilateral paralysis following unilateral angina. The rule is only a general one and liable to many exceptions.

The commonest instance of this influence is seen in the paralysis of the palate, but the influence in these cases is not so striking as in cases where the membrane has been in some unusual locations; for example, a paralysis of the arm following a diphtheria of the skin of the fingers, or a paralysis of the abdominal muscles following a diphtheria about the umbilicus.

Aubertin,² in an article appearing about the same time, enters into a somewhat detailed consideration of special forms of *postdiphtheritic paralysis*. He has found that generally there is not complete loss of motility of the palate, but only a paresis, which becomes more marked on effort to say *A*, *E* or *I*. The movement of the anterior pillars in these cases is slight, though usually more active with deglutition than

¹ Archives générales d. médecine, 1903, i., 321.

² Bull. et mém. d. Soc. méd. hôp., 1903, 12.

with phonation. The posterior pillars are usually respected. Sensory disturbances are exceptional, and when found the loss is very rarely complete. The pharyngeal reflex, usually described as lost, was absent in but three of the sixty-five cases.

Of nineteen cases of paralysis of the accommodation, none presented mydriasis. The pupil reaction to light was always normal and generally so to distance, but in some cases there was no reaction of the pupil to accommodation, thus presenting an inverse Argyll-Robertson pupil.

Paralysis of the extrinsic muscles of the eye was less common and always partial. Aside from the very rare instances of paralysis accompanied by atrophy and loss of power lasting several weeks, a diphtheritic paraplegia is usually so slight as to escape the notice of the parents, or, if noticed, is referred to the weakness of convalescence. The paralysis is flaccid, almost without sensory disturbances, and without involvement of the sphincters. The knee-jerk and Achilles reflexes are always abolished. This is the most constant symptom of the diphtheritic paraplegia. It is the first to appear and the last to disappear.

In regard to the ataxia so often reported by others, Aubertin says that he has not seen it, although a certain amount of awkwardness is seen which is to be referred to muscular weakness. He found no instance of a loss of the muscle sense or the Romberg symptom.

Aubertin has never seen the complete bulbar crisis such as has been described, but has often seen a combination of vomiting and cardiac disturbances which may reasonably be referred to a bulbar origin. In one case he saw the pulse fall to 17 per minute, counted by auscultation of the heart. Moreover, there were periods as long as fifteen seconds without a heart-beat; then came the beats closer and closer together, though never reaching the normal frequency, and then slower and slower to complete interruption—a sort of Cheyne-Stokes rhythm of the heart. The case ended fatally in coma.

In regard to the nature of the pathological process underlying the paralysis: some like the partial paralyses of the pharynx, and the dissociated paralyses of the eye muscles speak for a neuritic origin, while the general paralyses of the legs without sensory disturbances and with possible atrophy suggest a very diffuse but mild anterior poliomyelitis.

He also agrees with others that the paralyses are more common since the use of the serum, because of the fact that many severe cases—in other words, just those most in danger of subsequent paralysis—formerly died before the time for the onset of this complication.

Bolton¹ reports two cases of *optic neuritis* following diphtheria—one a boy, aged fourteen years, and the other a girl, aged sixteen years.

¹ *Lancet*, December 13, 1902.

Postdiphtheritic paralyses were present in both cases. Only the boy had been treated with the serum. In him the neuritis developed in the fourth week, while in the girl it appeared between the third and fourth weeks. The neuritis lasted some two months and then disappeared.

Faber¹ has studied with the Gärtner tonometer a large number of children sick with diphtheria, and found that in the mild cases and in some of the severe cases there was no alteration in the *blood pressure*. But in most severe cases and in all of the severest cases there was a marked fall in blood pressure, reaching the minimum at the end of the second or beginning of the third week. From this point it gradually rose, reaching normal at the end of the fourth or fifth week. There were not always other symptoms of the threatening collapse, and for this reason finds in this fall in blood pressure an important and constant sign of danger.

Faber divides the fatal cases into five groups: 1. Those dying during the first week, while the local process is still active and before complications have developed. 2. Those dying during the second or third week, after the fever has ceased and the exudate has disappeared. The death in these cases is preceded by a peculiar apathy alternating with restlessness. 3. Those dying of some affection of the respiratory apparatus. 4. Those dying during the stage of paralysis. 5. Those dying from some accidental complications.

In the first two groups Faber holds that death is the result not of cardiac paralysis, but of paralysis of the vasomotor centre. In the third group death is usually the result of gradual asphyxiation and carbon dioxide poisoning. In the fourth group paralysis of respiration is the common cause of death.

Rocaz² draws renewed attention to the possibility of a primary *diphtheria of the pharyngeal tonsil*, and reports a number of cases. The symptomatology consists of a swelling of the cervical glands, with the symptoms of diphtheritic intoxication. There is increased difficulty in breathing, headache, and earache. The throat shows nothing except a possible redness. The constitutional disturbances are those of diphtheria, whatever the location of the membrane. The importance of the diagnosis is manifest, and should be easy if thought of. This possibility should be carried in mind, and any child known to have adenoids and presenting symptoms of an obscure infection should have cultures made from the postnasal space.

Malaria. This disease, like diphtheria, is now very thoroughly appreciated. We know its causal agent, the way in which this agent is

¹ Dissertation, Copenhagen, 1903, 105.

² Gazette hebdomadaire des sciences médicales de Bordeaux, 1903, 86.

spread from individual to individual, and we have a process of specific treatment. In spite of this extensive knowledge there are still many minor phases of the disease which are obscure, and it still remains to diffuse the knowledge now in the possession of the profession to the laity in order that they may derive the benefit of the knowledge more fully than they can if it remains confined to limited circles. There have been in quasi-scientific popular journals and in many widely circulated newspaper articles statements of the relation of the mosquito to the diffusion of malaria, and these articles have led to action, by various health authorities, tending to the destruction of the mosquito. Some good has been accomplished, but too little attention has been and is being paid to the isolation of patients suffering from malaria and the continued use of quinine after the disappearance of the active symptoms. So far as is yet known, the mosquito can become infected only through biting some patient in whose blood there are malarial organisms, and much good can be accomplished by preventing the infection of the mosquito.

TRANSMISSION OF MALARIA BY MOSQUITOES. The number of articles appearing during the year upon malaria is notably less than a few years ago, and they are largely devoted to certain aspects of the disease and its treatment. Most of them contain nothing that is new and often little that is interesting. Some, however, are interesting and suggestive. One of the most interesting articles during the year is the report of a winter epidemic of malaria in a hospital following the accidental escape of a number of infected anopheles. This report, by Jancso,¹ is of cases developing in the latter part of November and the early part of December in the medical wards of the hospital in Kolozsvár. Malarial cases occur in this hospital, but the cases are always imported, no case ever having been observed in a native, probably because the only native mosquito is the *Culex pipiens*, the *Anopheles claviger* never being found. Jancso has been studying malaria there and in neighboring territory for eight years, and has never seen a fresh case developing in November or later, although relapses are seen at this as at any other season of the year. It has also been noted that when the winter sets in early the malaria disappears earlier than in years when the cold weather is delayed. This year the winter came on early, and by the middle of September fires were necessary, and by the beginning of November the thermometer was ranging from -7° to -10° C. During the fall studies were made of the development of the malarial parasite in the body of anopheles mosquitoes imported for this purpose and left caged in the laboratory. On November 2d a large number of anopheles were given an opportunity to bite a patient suffering from

¹ Deutsche Archiv f. klinische Med., 1903, lxxvi. 474.

malaria. The anopheles were kept in a cage at suitable temperature, and on the 7th a patient not suffering from malaria was exposed to the anopheles. The next day a number of anopheles were dissected and cysts filled with sporoblasts were found. On November 13th some sixteen to twenty anopheles yet remaining sucked blood from a patient free from malaria. The next morning it was found that the cage containing these anopheles had been overturned and all but four had escaped. The doors and windows of the laboratory were opened at the time, and inasmuch as it was thought that the mosquitoes had flown out, nothing much was thought of the matter.

Thirteen days later, on November 26th, the laboratory helper was taken sick with chill, followed by fever and sweating. The next morning he felt better, but in the evening he had a second chill and developed a labial herpes. The spleen was found to be enlarged. The next day the patient felt well, and remained so. In spite of the time of the year malaria was strongly suggested by the symptoms, but the blood examination did not show the plasmodia.

On December 3d two women were taken sick with chills, fever, sweating, splenic tumor, and in both the malarial parasite was found in the blood. Neither patient had ever had malaria. This experience recalled the escape of the anopheles three weeks before, and the living rooms of these women were examined and, while many of the *Culex pipiens* were found, no anopheles were discovered.

On December 4th one of the servant girls developed a malaria, and search through her room discovered two anopheles, in both of which sporocysts and sporozoites were found.

These cases led to a systematic examination of the blood of all patients with a temperature the cause of which was in any way obscure, and the number of cases of malaria was raised to nine, no one of which had ever had malaria. These cases had all developed between November 26th and December 9th, beginning thirteen days after the escape of the anopheles and continuing close after one another to the twenty-sixth day.

Careful search through the living rooms of the hospital attendants and through the wards and corridors recovered seven infected anopheles. This search, with efforts directed to the destruction of any mosquitoes overlooked, and a course of quinine to all exposed, caused the prompt disappearance of the epidemic.

This is simply another instance of malaria developing in an unusual place and at an unusual time of the year as a result of exposure to infected anopheles. The cases were to all intents and purposes inoculation experiments, but are of particular interest because of their number and the circumstances under which they developed.

INFLUENCE OF COLD AND QUININE ON THE MOSQUITO. So far as we know there has been but little, if any, study of the influences which affect the development of the plasmodium in the body of the anopheles. This matter would seem of importance, and we note with considerable interest an abstract of an article by Schoo¹ containing a report of some interesting studies of the influence of cold and quinine upon the development of the malarial parasite in the body of the anopheles.

It was found that a steady temperature of 25° C. (77° F.) led to a development of the cysts in twelve days, and the sickle spores appeared in the salivary glands on the fourteenth day. If the mosquito continues in favorable temperature for two days after sucking blood a later cooling to even 15° C. (59° F.) or 10° C. (50° F.) does not interrupt the development of the parasite. If from the start the mosquito is kept at 18° C. (64.4° F.) the parasites develop, but do so slowly. If kept at 15° C. (59° F.) the parasites do not develop. If kept at 30° C. (86° F.) the cysts develop more rapidly than they do at 25° C. (77° F.).

Mosquitoes sucking blood from a patient who received fifteen grains of quinine for three days remained sterile. Ten anopheles were allowed to bite a patient on the day when he was free from fever. The next day the patient was given fifteen grains of quinine four hours before the expected chill, and six hours later was exposed to nine anopheles. The first ten anopheles developed parasites, while the second lot did not.

DIFFERENTIAL BLOOD COUNTS IN MALARIA. During the year a number of articles have appeared, particularly by men practising in India, upon the diagnostic value of differential counts of the white blood corpuscles in possible cases of malaria. Some of them regard this method as easier than the examination for plasmodium, but I think that anyone who has done much blood counting would prefer the examination for the plasmodium, tiresome as this sometimes is. Delaney² reports the differential counts of the white blood corpuscles in fifty-seven cases of malaria. In all but four cases there was a considerable reduction in the number. The lymphocytes were relatively increased, often making 60 per cent. of the total number. A marked peculiarity is the increase in the number of large mononuclear cells, and Delaney regards an increase to 12 per cent. or more as very suggestive of malaria. Of fifty-three cases, forty-four showed 12 per cent. or more of this form of cells.

The value of this work, which must have been laborious, is rendered

¹ *Centralblatt f. Bakteriologie, Parasitenkunde*, xxxiii., 13.

² *British Medical Journal*, March 28, 1903.

questionable by the statement that in only 17 per cent. of the cases was the diagnosis of malaria confirmed by the demonstration of the plasmodium, and Delaney makes use of this statement: "If, then, the diagnosis of malaria can be made in 90 per cent. of the cases by the blood count, and in but 17 per cent. of the cases by the parasitic test, there can be no question as to which is the superior method."

All competent authority is agreed that a diagnosis of malaria is not complete without the demonstration of the plasmodia, and cases cannot be used as a basis of argument unless no question can be raised as to the diagnosis. No doubt thousands of cases of malaria are correctly diagnosed by men who never saw a plasmodium, but all who have had experience with malaria will admit that in any given case the diagnosis may be wrong unless confirmed by the demonstration of the plasmodium.

The demonstration of the plasmodium is often difficult, but a suggestion made by Ross may make it easier. Ross suggests the use of a larger amount of blood than is ordinarily used, and spread thick. This thick smear after drying is stained with a watery eosin. This stains the stroma and removes the hæmoglobin from the blood corpuscles. The smear is then washed very gently with water stained with some nuclear stain, again washed gently, and after drying sealed under glass with Canada balsam. In this way relatively large amounts of blood are overlooked quickly, and Ross, from personal experience, states the method to be easy and to yield results many times better than the method ordinarily employed.

Mountain Fever. In the latter part of 1902 Wilson and Chowning¹ made a report of a study of cases of this disease seen in Montana, and expressed the opinion that they had found the causal organism in a protozoa which inhabits the red blood corpuscles. The organism is not pigmented, but is amœboid, and resembles closely the pyrosoma bigeminum, the causal organism of Texas fever, but is larger and shows amœboid movements.

They were led to believe that this organism enters the human host through the bite of some form of tick by the following facts: The mountain fever is confined to the season of the year in which ticks are active—*i. e.*, from March to July. The fever occurs in isolated cases, for there are no instances of contagion in sharply limited regions, indicating the conveyance of the germ by some temporarily parasitic animal which travels slowly. The tick answers this description.

All the hæmatozoa of warm-blooded animals of which the life cycle is now known pass at least one phase of their development within the

¹ Journal of the American Medical Association, 1902, xi., 131.

body of some host other than the one whose blood cells they invade, and usually this other host is an insect or arachnid. The organism of Texas fever in cattle is very closely related to the organism causing the mountain fever, and it enters through the bite of the tick.

All patients coming under observation had been bitten by ticks; in three cases there was a history of a single severe tick-bite two, three, and five days before the onset of the disease.

This report of Wilson and Chowning finds confirmation in a report by Anderson¹ in September of this year. He studied cases upon the west bank of the valley of the Bitter Root in Montana. No cases occurred upon the east bank except among those which had recently been across the river. Cases of mountain or spotted fever have been known through this country for twenty years. They occur also in Idaho, Nevada, Wyoming, and Oregon, and only during the spring, the earliest being on March 17th and the latest on July 20th. The number of cases increase during the early spring months, and then decrease, to stop entirely in the middle of July. They occur only in those whose occupation takes them out-of-doors, particularly among those who go into the brush. The age of the cases ranges from fifteen to fifty years, and considerably more males than females are affected.

The organism is an ovoid intracorpuseular body showing amoeboid movements and closely resembling the organism of Texas fever and that of malaria. It is not pigmented. Three forms occur. The commonest is of a single, ovoid, refractile, intracellular body; the next and less common is larger at one end, and in this end is a large granular spot. The third form is in pairs of pyriform bodies with the small ends together. This form shows no amoeboid movement, while the other two forms do. The organisms are always few in number. The name *pyroplasma hominis* has been suggested.

Anderson agrees that the organism enters by the bite of the tick usually about seven days before the onset of the disease. This method of infection probably explains the small number of cases and the small area to which these cases are confined. The tick is a parasite of very slow migration, and the short period during which it lives, the spring and early summer, prevents its getting far.

In Texas fever the parasite develops in the body of the female tick, and the young tick transmits the infection. It is reasonable to suppose that a similar thing happens in this disease. Because of the irritation caused by the tick in the human only a small number of ticks escape destruction, and, therefore, only few infected young are developed to carry the infection further.

¹ American Medicine, September 26, 1903.

Anderson examined a child twenty-four days after it had been discharged as cured of the spotted fever, and found the organism still present in the blood. It is easy to see how such cases furnish a source of infection.

After an incubation period of from three to ten days following the bite of the tick the patient begins to show headache, malaise, diffuse muscular pains, moderate gastrointestinal disturbances and other symptoms common to the infectious diseases. Then comes a chill, usually single, followed by a temperature which gradually goes higher and higher until it reaches the maximum somewhere between the eighth and twelfth day. Then in favorable cases it falls and reaches the normal about the fourteenth to eighteenth day.

The pulse is peculiar in that it is rapid, out of proportion to the degree of temperature. The respirations are rapid, and more so than might be expected from the accompanying bronchitis.

Upon the third day the eruption appears first upon the wrists, then on the legs, forehead, chest, back, and, last and least, upon the abdomen. The eruption consists of bright-red macules, varying in size from that of a pinhead to that of a split pea. At first the color disappears upon pressure, but later the color is deeper and is not affected by pressure. The eruption fades as the fever falls. Jaundice to some degree occurs in all cases. The spleen is enlarged early. The blood shows a moderate leukocytosis, 8000 to 12,000, and the organism described above.

The treatment heretofore has been unsatisfactory, but the demonstration of the cause of the disease suggests the use of quinine and also its hypodermic use. This practice has been successful in the few cases in which it has been employed.

Measles. Everyone who has experience with children will admit that this disease is one of the most important of the diseases of childhood, both because of its immediate mortality and because of its relation to tuberculosis. No one yet knows how frequent this disease gives the tubercle bacillus the opportunity of planting itself upon a new host. It is, therefore, remarkable that this disease is receiving almost no attention, and, although its cause is unknown, there is no evidence that much effort is being made to discover it.

The literature of measles during the year contains little more than reports of cases which present some unusual or interesting peculiarity. A few of these cases are quoted.

COMPLICATION OF MEASLES. Craik¹ reports the case of a boy who, after complaining for four days of pain in the left knee-joint, not due to any injury, broke out with the typical rash of measles. At this

¹ *Lancet*, 1903, i., 237.

time and for a few days more the knee was not red or swollen, but later the knee became swollen, the temperature rose after being down some days, and the knee-joint was freely opened, allowing the escape of a large amount of synovial fluid and a little pus. The knee was drained for a few days. The case ended in recovery. Note is made of this case because of the great rarity of this complication of measles. It is remarkable that it should be so rare, for most of the other diseases accompanied by pharyngitis are rather frequently complicated by joint changes.

Machold¹ reports the case of a child, aged eight years, who with all the members of its family had had measles. Two days after the child was allowed to be up and twelve days after the onset of the measles the mother noticed the child's feet were blue, as if stained by a stocking. The night passed quietly, and the next morning the child made no complaint, but showed, scattered irregularly over the entire body, a bluish-red eruption, only here and there slightly elevated above the skin and, in general, of roundish shape. The feet were entirely blue to the ankles. Pressure caused only a partial disappearance of the color. On the flanks were a few spots which looked like fresh hemorrhages. Physical examination was negative, except for a bronchitis and a palpable spleen. The temperature was normal. The eruption gradually faded and was followed by fine scaling. Machold is inclined to believe the case one of relapse of measles. No drug of any sort had been taken, thus excluding any drug exanthema.

Hicks² reports two cases of typical *peritonitis* developing as a result of measles, but ventures no opinion as to the cause or nature of the peritonitis, and it should also be stated that the data as given are so limited that one can form no firm opinion as to whether the diagnosis was correct or not. Both cases recovered.

Pneumonia. BLOOD CULTURES IN PNEUMONIA. One of the most important (if, indeed, not *the* most important) results of this year's work upon pneumonia has been the strengthening of the new ideas as to the nature of pneumonia, growing out of the demonstration of the pneumococci in the circulating blood. Up to a very recent date pneumonia has been regarded as an example of a local infective process accompanied by constitutional symptoms of toxic origin, a process comparable to diphtheria. The instances, of which there were a comparatively large number, in which the pneumococci had been found in the blood were regarded as accidents and the pneumococcæmia as a complication. These cases were looked upon as especially serious, and the demonstra-

¹ Münchener med. Wochenschrift, 1903, 684.

² Annales of Gynecology and Pediatrics, 1903, 21.

tion of the pneumococci in the blood was regarded as a sign of the gravest prognostic significance. During the last few years the percentage of cases in which these organisms have been found in the blood has been greatly increased by the introduction of new methods of culture. Formerly only small quantities of blood were employed in making cultures, thus requiring for success the presence of the cocci in such large numbers that every drop or two of blood was infected. The modern method of using large amounts of blood, a centimetre or more, and diluting this by the use of large amounts of fluid culture media, oftenest bouillon, to $\frac{1}{2}$ to 2 per cent., has given an increasingly larger percentage of positive results, until now we must believe that the pneumococci are present in the blood in all cases of pneumonia, and any failures to find them are due to faulty technique or to insufficient search.

There has been a very considerable number of publications upon this subject. Widal, Lemièrè, and Gadano¹ report eighteen cases of pneumonia, in which blood cultures were made. In six of these the pure cultures of the pneumococci were obtained, and in twelve the cultures were negative. Philippi² reports a case giving the ordinary symptoms and signs of acute croupous pneumonia, in which blood cultures were made and only the pneumobacillus of Friedländer grew. The patient died, and the same organism was obtained from the lungs.

By far the most valuable contribution to this subject is that by Rosenow,³ who reports upon some work done for the purpose of determining the frequency and the time of general pneumococcus invasion in acute lobar pneumonia, the diagnostic and prognostic value of the blood cultures in these cases, and of studying the agglutinating and bactericidal actions of pneumonic blood serum.

Eighty-three cases were examined, and positive results were obtained in seventy-seven. In most cases only one culture was made, but in the cases in which several cultures were made to determine, if possible, a relationship between crisis and the pneumococæmia the percentage of failure was higher thirty-six hours before the crisis than on the fourth and fifth day of the disease. In one case a culture was obtained twelve hours after the initial chill. Of five cultures taken on the second day two were positive and three negative. In some cases cultures were obtained after the crisis, an experience which I can personally confirm. In nine cases cultures and leukocyte counts were made at the same time. In one fatal case the cultures were positive, but there was no leukocytosis. The other eight cases showed a leuko-

¹ Münchener med. Wochenschrift, November 11, 1902.

² Bull. et Men. de la Soc. Méd. de Hôp. de Paris, 1903, 415.

³ Transactions of the Chicago Pathological Society, 1903, 265.

cytosis of from 13,000 to 42,400, and seven of them showed the pneumococci present in the blood.

Several cases are mentioned in which this method of examination was of great value in the diagnosis, an observation which I can confirm by repeated personal experience.

The prognostic value of the *pneumococœmia* is not great. It was formerly supposed that the pneumococci were found only in the most serious cases, but the truth is that they are probably present in all cases. Rosenow found them in over 92 per cent. of the cases examined, so large a percentage that the failure to demonstrate them in the other 8 per cent. is readily accounted for by the fact that in most cases only one examination was made. *Agglutination tests* were made in sixty-five cases. Serum on the second day shows a distinct agglutinating power, and this power increases up to the time of the crisis, and then gradually diminishes. Marked power was found several times as late as thirty days after the serum was drawn, but in general ageing the serum loses its power. The highest dilution at which agglutination could be obtained was 1:40 or 1:50. The serum from two cases of epidemic cerebrospinal meningitis did not agglutinate the pneumococcus, but did the diplococcus intracellularis of Weichselbaum. Rosenow does not believe there is any bactericidal power in the blood over the pneumococcus.

The theoretical and diagnostic value of this method of examination cannot be questioned, but there are unfortunately some rather serious obstacles to its introduction into private practice. All methods requiring the use of culture media, and especially fluid media, are difficult to employ in house practice, even in thickly populated districts, while they must be well-nigh impossible in country practice. For this reason the results obtained by the staining of blood smears is, perhaps, of greater value to the bulk of practitioners. Rosenow by persistent search was able to find the pneumococci in smears from the blood in thirty-five cases. In three of these cases the cultures remained negative. It appears probable that a slight modification in the method of making blood smears would yield a much higher percentage of positive results. If the smears were prepared in such a way that the blood was spread very thick instead of very thin, as is best for most purposes, and then after fixation freed of the hæmoglobin and stained, it is likely that the percentage of positive results would be much greater. If this suggestion upon trial proves of value we would have a method of much wider utility.

FREQUENCY OF PNEUMONIA. The increasing frequency of pneumonia is attracting a gradually widening interest, and has been the subject of some earnest discussion during the year. A. G. Brown, in

commenting upon the mortality of pneumonia,¹ draws attention to the fact that during the last decade the average length of life has increased from 31.1 years to 35.2 years, and yet the frequency of pneumonia has increased, and while the mortality in most acute infectious diseases shows a most encouraging reduction—in some instances a very marvellous reduction—that of pneumonia is certainly not reduced. Tuberculosis, which formerly caused one-seventh of all deaths, is decreasing, and no longer occupies the position of “captain of the crew of death.” This position has now been usurped by pneumonia.

The Twelfth Census Bulletin, of August, 1901, places pneumonia at the head of the death column, it having been the cause of 55,296 deaths during the year 1900—i. e., 191.9 persons died of pneumonia out of every 100,000 population. The Bulletin of the Chicago Board of Health states that in that city there were 25,719 deaths from pulmonary tuberculosis between the years 1851 and 1890, and 16,577 deaths from pneumonia during the same period. This is an excess of more than 35 per cent. for tuberculosis. Between 1891 and 1901 there were 22,957 deaths from pulmonary tuberculosis, and 25,228 deaths from pneumonia, making an excess of 9 per cent. in the deaths from pneumonia during the last decade.

French,² in considering the subject of the prognosis in pneumonia, also draws attention to the increasing mortality, using Massachusetts as an example. In 1860 pneumonia caused 10.82 deaths for each 10,000 population, and in 1890 it caused nearly twice as many, 18.83 per 10,000. During the same year the death rate from consumption fell from 37.02 to 18.05 per 10,000. Between 1861 and 1871 the deaths from pneumonia formed 3 per cent. of the deaths from all causes. In the two succeeding decades it formed respectively 5 per cent. and 6.7 per cent. of the total deaths, but in the last decade, 1891 to 1901, it rose to 10 per cent. of deaths.

Various influences have been blamed for this startling increase, but no explanation yet suggested can be regarded as satisfactorily accounting for it. Probably no single influence is alone sufficient. Anders³ expresses the opinion that the increased amount of time which people generally spend indoors is a factor, and that overcrowding is another.

No one would question the deleterious influence of both these factors, but it is probable that they act only indirectly by lowering the resistance of the individual and by multiplying the opportunities for contagion. Anders also expresses the opinion that certain underlying conditions of the system, leading to degeneration, particularly of the

¹ American Medicine, 1903, v. 537.

² Medicine, 1903, 171.

³ Ibid.

heart and kidneys, are potent influences in this increasing frequency of pneumonia.

CONTAGIOUSNESS OF PNEUMONIA. Another factor which is receiving more attention than formerly, and, perhaps, more than it deserves, is that of contagion. When one considers the almost absolute ubiquity of the pneumococcus, contagion is an unnecessary assumption. It is probable that the pneumococci can be found in the air-passages of most of us all the time and all of us some of the time. That contagion is not an important item is also shown by the fact that in all hospital wards pneumonic patients are mixed in with the other patients, and yet only rarely does pneumonia develop in the neighboring patients. Occasionally an individual experience will lend strong color to this idea. Numerous instances of institutional, ship, and house epidemics of pneumonia have been recorded in the past, and during the year Baduel and Gargani¹ has added the report of a house epidemic involving eleven individuals. This report deserves mention, not only because of the epidemic character of the pneumonia, but also as an instance of the diagnostic value of methodical examination of the blood. It also shows in a very striking way the fact that the pneumococcus can cause many other clinical pictures than that of a pneumonia. The first of these eleven cases was an otitis media, then three cases of pneumonia, one of which was complicated by an empyema; four of catarrhal bronchitis, one of which was complicated by a conjunctivitis, a case of ulcerative gingivitis, a case of parotitis, and one of catarrhal angina. In all of the cases, except the gingivitis, the blood taken from the veins showed the Fraenkel-Weichselbaum diplococcus, and in all the blood serum agglutinated the diplococcus. All of the cases recovered.

During the past winter I had a personal experience which strongly suggests contagion. I saw in consultation a woman manifestly dying from a pneumonia. Two other adults had died in the previous three days in the same house and family with croupous pneumonia. Another adult had died a year previous in the same house and of the same disease. Such experiences as these are strongly suggestive, but it must be remembered that they are very exceptional.

PROGNOSIS OF PNEUMONIA. Sears and Larrabee publish a careful review of 949 cases of pneumonia between the ages of fifteen and forty-five years treated in the Boston City Hospital, viewing the cases especially from the standpoint of prognosis. In general their conclusions are confirmatory of previous experience, but differ in a few points. Like others, they find that age is a very important influence, and that the mortality rises with the age. The height of the temperature is

¹ Gazz. degli ospedali e delle clin., 1903, ii.

important, probably more as a guide to a prognosis than as an actual factor in causing death, except in the cases in which there is a hyperpyrexia. Sears and Larrabee found a mortality of 55 per cent. of the cases with temperature under 102° , and 65 per cent. in cases over 102° . Instances of fatal low temperatures were generally in senile cases. Cases in which the pulse passed above 130 had a mortality of over 50 per cent. If the respiration remains under 30 the mortality was less than 9 per cent.; if under 40, less than 15 per cent. Above 40 respirations the death rate rose rapidly, but in one case recovery occurred, even though the respirations rose above 70. In making use of these figures as an aid to a prognosis in any given case it must be remembered that the figures are based on cases between the ages of fifteen and forty-five years.

The influence of *alcoholism* both upon the causation and the mortality is noted. It is frequently given as a predisposing cause, and this is probably correct, for it both lowers the resistance of the individual and often causes great exposure to cold, another important predisposing cause of pneumonia. The mortality among total abstainers is 25 per cent., while it is 45.5 per cent. among the hard drinkers. Moderate drinkers show only a slightly higher mortality than the total abstainers.

The amount of albumin in the urine is also a factor in estimating the prognosis. The larger the amount the higher the mortality. No note is made of the frequency of casts in the urine, but it may be stated that they occur with great frequency. Neither the albumin nor the casts results, as a rule, from a complicating nephritis.

The leukocytes were counted in 211 cases, and the results show that the mortality is higher in cases showing a leukocyte count of less than 10,000. The diazo reaction was found in only four cases, three of which ended fatally. Heart murmurs were frequently found, but their interpretation is not clear. An observation at variance with the current opinion was made upon eighty cases of chronic endocarditis. The mortality was not apparently affected by the heart lesion.

French, in a paper to which reference has already been made, covers much the same ground and reaches about the same conclusions. He draws attention to the influence of sex upon mortality. The mortality in the females bears a relation of three to two to mortality in the male. The portion and the extent of the lung involved is also of importance. The danger increases proportionately to the area involved, and pneumonia of the upper portion of the lung is more fatal than pneumonia of the lower portions. Another important but still unexplained factor is the character of the epidemic. There is no doubt but that in some years pneumonia, like the other infectious diseases, is more dangerous than in other years.

INFLUENCE OF ALTITUDE ON PNEUMONIA. Henry Hoagland,¹ of Colorado Springs, contributes a paper upon the influence of altitude upon the mortality of pneumonia, written in an effort to correct, both in the profession and in the lay mind, the impression that pneumonia is much more fatal in the mountains than at the sea level. While admitting that there is a point above which the altitude has an effect, this point is higher up than 7000 feet. He compares the mortality rate of 6116 cases in the Eastern hospitals with a death rate of 26.8 per cent., with 709 cases at an average elevation of 6580 feet (minimum 4700 feet and maximum 10,000 feet) with a mortality of 22.1 per cent. There is some room for error in the great difference between conclusions based upon 6000 and those based on 700 cases, but it must be seen that this comparison shows that for levels up to 7000 feet the altitude has but little effect.

There are two other influences which should be mentioned in this connection. The relatively high percentage of tuberculous patients in this country would have a tendency to send the mortality higher, while the fact that the communities are new, and with relatively few old people among the inhabitants, would seem to lower the death rate.

Connell² is led by the article of Hoagland to report upon his personal experience with pneumonia at Leadville, which is at an altitude of 10,200 feet. His personal cases with those of St. Vincent's Hospital, in all 261 cases, showed a mortality of 26.4 per cent. This mortality rate is so close to that at lower levels that one must agree with Connell in stating that altitude has no influence upon the mortality, etiology, prognosis, or treatment of this disease.

SPECIAL SYMPTOMS OF PNEUMONIA. During the year certain special aspects of pneumonia have been discussed at length, and some of these, because of their practical or theoretical interest, have been selected for brief discussion.

Herrick³ draws renewed attention to the occurrence of *abdominal pain* in pleurisy and pneumonia, and illustrates it with a number of clinical observations. The anatomical explanation is as follows: The lower six intercostal nerves supply the abdominal walls as well as a part of the parietal and diaphragmatic pleura. Irritations of these nerves in their course might readily cause a pain which would be referred to their distribution—i. e., to the abdomen. Particular note should be made of the eleventh intercostal nerve, which is distributed to the iliac region. Irritation of this nerve with referred pain has more than once caused suspicion of an appendicitis. Other nerves

¹ American Medicine, 1903, v, 536.

² Ibid., 947.

³ Journal of the American Medical Association, 1903, ii., 535.

would cause pain referred to the umbilical, epigastric, or hypochondriac region, and excite suspicion of ulcer of the stomach, some disease of the gall-bladder, and the like.

Another possible explanation of some of the abdominal disturbances seen in pleurisy and pneumonia is an involvement of the phrenic nerve. This nerve may become involved, particularly in the diaphragmatic and mediastinal pleurisy, and the resulting symptoms be referred to the abdomen.

In a recent personal observation upon a case of pneumococcus inflammation of the diaphragmatic and mediastinal pleura, I saw pain referred to the abdomen and to the right shoulder-joint, and believed that in both locations the pain was due to irritation of the phrenic nerve, with radiation of the pain.

This subject of abdominal pain has received considerable attention from a number of French authors, and is of importance because this referred pain has led to the diagnosis of surgical conditions in the abdomen and to operations for their relief when the whole trouble was above the diaphragm. The error is easily avoided by a systematic examination of the chest.

A symptom of pneumonia, or, more properly speaking, of infection with the pneumococcus, which is not so generally appreciated as it should be, is *herpes*. This eruption is very common in pneumococcus infections, so common in fact that its presence in any obscure infection should lead to the suspicion of a pneumococcus infection and an examination of the blood for this organism. The only other infectious diseases in which this eruption is at all common are the epidemic cerebrospinal meningitis and the malaria. Howard¹ has published a most important article upon the herpetic eruption as it appears in croupous pneumonia, and, after a review of the literature, reports two personal observations of herpes in pneumonia, with autopsies. One of these showed a herpes zoster, and the spinal ganglion of the corresponding cutaneous nerve showed definite changes, consisting of congestion and hemorrhage, cellular infiltration, and degeneration of the ganglion cells. The other case showed a labionasal herpes, and the corresponding Gasserian ganglion showed hemorrhage, cellular infiltration, and vacuolation of the ganglion cells. Herpes about the nose and mouth is particularly common in pneumonia, and the opportunities for further study of the changes in the Gasserian ganglion are numerous. Howard is of the opinion that herpes is a pathological condition with definite lesions of sensory ganglion, sensory nerves, and skin excited by a variety of causes. It is probable that the primary

¹ American Journal of the Medical Sciences, February, 1903.

ganglionic lesions are due directly or indirectly to soluble toxic bodies, some introduced from without, such as arsenic, carbonic acid gas, and others, or formed within the body, as in coryza or the gastrointestinal intoxication, or, lastly, formed by various pathogenic organisms, particularly the pneumococcus, its first cousin the meningococcus, and the plasmodium of malaria. The primary or spontaneous herpes is thought by Head and Carpenter to be a specific infectious disease.

CROUPOUS PNEUMONIA IN CHILDREN. Gillet¹ publishes a very long and detailed article upon croupous pneumonia in children, drawing attention to its peculiarities and forms, for, according to Gillet, it is even more polymorphous in children than in adults. It is usually the result of infection with the Fraenkel-Weichselbaum diplococcus, but any one of a number of other organisms may excite it.

Among the symptoms mentioned is the arrhythmia of the pulse and the bradycardia, seen during early convalescence in children just as it is in adults. Deficient expansion of the subclavicular spaces, as described some time ago, is an early physical sign, and is seen even when the pneumonia is at the base of the lung. Pain in the region of the appendix, as an early sign of pneumonia, seems to be commoner in children than in adults, and can lead to an erroneous diagnosis of appendicitis unless care is taken to examine the lungs. Considerable swelling of the liver has been repeatedly noticed in children, an important fact, because such hepatic congestion may be the starting-point for a cirrhosis. *Urobilinuria* is commoner in pneumonia than in any other infectious disease.

Pfaundler and Luthje are quoted as having missed the knee-jerk in 55 of 200 cases of pneumonia in children. This loss may appear at the beginning, during, or after the disease, and may be unilateral or bilateral. This disappearance of the knee-jerk is not peculiar to pneumonia. Loss of the pupillary reflex has also been noted.

The *mortality* of croupous pneumonia is very low in childhood, only five deaths in 579 collected cases. The *treatment* was long ago summed up by Guersant as "Lait, lit, looch"—i. e., "milk, bed, and a cough mixture."

Complications are rare. Among those which may be mentioned are peritonitis and meningitis, cerebral disturbances, Jacksonian convulsions, hemiplegia and monoplegia, chorea, nephritis.

RELAPSE IN PNEUMONIA. Ebstein² draws attention to the contrast which exists between typhoid fever and pneumonia in regard to relapses. Relapses in typhoid are frequent clinical happenings, but once the

¹ Gazette des Hôpitaux, 1903, lxxvi., 749.

² Münchener med. Wochenschrift, 1903, I. 781.

patient is convalescent the disease is not apt to return, although Ebstein believes it is too much to say that the immunity from typhoid is permanent. Relapses in pneumonia are uncommon, but there can be no question of the fact that a person who has had pneumonia once is more liable to a second attack than he was to the first.

Ebstein then reports a personal observation in which a pneumonic patient, after a period of apyrexia, following directly after a typical crisis, and lasting seven days, had a second attack of pneumonia, which also ended by crisis. Such early recurrences of pneumonia are very rare. This is the only one Ebstein has ever seen. Wagner saw but two in 1100 cases.

Ebstein includes in this article a report of the recurrences of pneumonia recorded in 438 cases of pneumonia; 81 patients—i. e., 18.5 per cent.—stated that they had had pneumonia before, the number of attacks ranging from two to eleven.

Mason¹ reports another example of the rare relapse in pneumonia. It was in a young woman taken sick two days before admission and showing at entrance a well-developed pneumonia of the right lower and middle lobes. The course was severe, and, after pseudocrisis upon the ninth day, ended with a crisis upon the tenth day. During the tenth, eleventh, and twelfth days she presented all evidences of convalescence, but upon the thirteenth day a pneumonia of the left upper lobe began. It was characterized by great severity, and ended by a second crisis upon the twentieth day. These cases of relapse in pneumonia are so rare that they should all be recorded. I recall a personal observation of some years ago in which a young girl during convalescence from a rather severe pneumonia was found to have developed a consolidation of one lower lobe without experiencing any constitutional disturbances from it. Later her temperature rose, and, after being moderately high for three days, ended by crisis.

COMPLICATIONS OF PNEUMONIA. As usual considerable attention has been paid to the subject of the complications of pneumonia, and some of them are of interest and importance.

Miller² reports an additional case of *venous thrombosis* following pneumonia. The thrombus occurred in the branches of the femoral vein on the eighteenth day of a fairly severe pneumonia of the right upper and middle lobe in a male aged forty-four years. The temperature had fallen by lysis, reaching normal upon the sixteenth day. The symptoms of the venous thrombosis began after thirty-six hours of freedom from fever, and were only moderately severe, so that the patient left the hospital upon the thirty-third day.

¹ Boston Medical and Surgical Journal, 1903, 148, 177.

² Philadelphia Medical Journal, 1903, xi., 834.

Miller quotes extensively from the article of Dr. Steiner, an abstract of which appears in the *Johns Hopkins Hospital Bulletin* for 1902. Venous thrombosis has been known as a rare result of pneumonia—a fact which is the more striking because of the great increase in the fibrin factors of the blood. So far Miller finds note of but forty-eight cases, including three not yet published by Dr. Steiner. The venous thrombosis occurs as a sequel and not as an integral part of the primary process, and develops usually a few days after the crisis. It is more common in women than in men, and in almost all cases involves the lower extremities and more often the left than the right. Of the forty-eight cases the upper extremity was involved but three times. Nine of the patients died, and in five the death was due to pulmonary embolism.

I might add that I have personally seen three instances of venous thrombosis following pneumonia. In two the thrombosis involved the upper extremity, once right and once left. The third case was a male with a very richly developed collateral venous circulation from the right leg, developed, according to the very intelligent history which the patient gave, after a venous thrombosis following pneumonia.

Strada¹ makes an addition to the literature of *pneumonic endocarditis*, reporting that he found 9 cases of *diplococcus endocarditis* in 85 autopsies upon patients dying of pneumonia. In 6 cases the endocarditis was limited to the left heart, and in 3 to the right heart. Strada gives no data as to whether the basal valves are more often involved than the auriculoventricular valves, as has been so often stated elsewhere.

Complications on the part of the nervous system are very common in croupous pneumonia, but the great majority of these are infectious. The toxic complications are on the whole rare, and it is, therefore, with interest that we note the report by Rénon and Gérardel² of two cases of *postpneumonic neuritis*. One case was a man aged thirty-seven years, who had a typical moderately severe pneumonia of the right lung, ending by crisis on the ninth day. Two days later he began to complain of severe pain in the right forearm and tenderness over the cubital nerve and its distribution. Anæsthesia over this area manifested itself. Twenty days later the same clinical symptoms appeared in the left arm. Complete recovery took place in a few weeks more.

The second case was that of a woman, aged forty-seven years, who had been a moderate user of alcohol. She entered the hospital on the third day of a pneumonia of the right side. Dyspnœa and delirium were marked, and the general clinical picture was severe and complicated by symptoms of intoxication of the cerebrospinal axis. On the sixth day

¹ *Lo Sperimentale*, vol. lvi., 2 and 3. ² *Archives générales de médecine*, 1903, i., 401.

she suddenly developed a bed-sore over the left sacral region. The sudden appearance of the eschar, the sensory disturbance consisting of anæsthesia in the region of the bed-sore, and the topography all suggest a nervous origin, and the reporters incline to a belief in a neuritic origin.

Why neuritis, a common complication in many infectious diseases, is so rare in pneumonia no one knows; possibly because of the severity of the disease.

Szczypiorski¹ reports a case of *massive gangrene* of the left upper lobe, presenting such unusual features as to be a matter of interest. The patient was a metal worker aged forty-nine years, had a frank and typical pneumonia of the left lower lobe, to which, on the ninth day, there was added a pneumonia of the left upper lobe. The consolidation of the lower lobe ended in resolution, but gradually cavernous breathing developed over the upper lobe, the sputum became more and more abundant, and coming up at intervals. It became distinctly purulent, but was odorless. No tubercle bacilli were found. The general condition of the patient became worse and worse, and a diagnosis of an interlobar abscess, with possible gangrene, was made. The patient was operated on, and a non-fetid gangrene of the left upper lobe was found. Five days after the operation an enormous mass of lung tissue came away without difficulty and without the loss of any blood, leaving a large cavity into which a large bronchus opened. A few days later the patient developed a pneumonia of the right side, probably embolic, and died.

The features of this case which should attract attention are: the development of gangrene after a frank pneumonia, the rapidity of the evolution of the gangrene, the entire absence of all odor, the extent of the lung involved, one entire lobe, and the freedom from hemorrhage.

The sixty cases of *pneumococcus arthritis* collected by Cave and Cole, and last year by Herrick, received eight additions by Slaughter.² Four of these cases were of the knee-joint, two involved the hip, and in one both wrist and one hip were involved. The only small joint affected was a metacarpophalangeal joint. The ages ranged from five months to sixty years, but five of the cases were less than fourteen months. In two of the cases there was no preceding pneumonia. In all the joints suppurred.

Sears and Larrabee, in the article previously quoted, state that there were twenty-three instances of arthritis in the 949 cases reported by them, and seven of these cases were fatal.

¹ Gazette des Hôpitaux, 1903, 979.

² American Medicine, 1903, 605.

TREATMENT OF PNEUMONIA. It is a matter of serious regret that one must admit that none of the fairly numerous articles which have appeared during the year upon the treatment of pneumonia are real additions. Some of them concern drugs tried with encouraging results upon a short series of cases, others treat of methods already tried and found wanting. We know nothing which actually helps the patient. Let us, therefore, be certain that we do no harm.

J. B. Herrick¹ has a brief and pointed paper upon the treatment of pneumonia, or rather upon how not to treat pneumonia. In the first place, it is not necessary to shut off fresh air from a pneumonia simply because there is a popular impression that pneumonia is due to taking cold. Secondly, the diet ought not to be according to some hard-and-fast rule, but should be varied to suit the individual case. If the digestion is impaired, a light diet, mainly of milk; but if the digestion is active, a more liberal diet, eggs, broths, cereals, fruit, and even meat. Water should not be withheld but given freely, because it favors elimination and lessens the toxæmia.

In almost all diseases except pneumonia pain is relieved, if necessary, by morphine. In this we agree with Herrick, that while morphine and opium are to be used thoughtfully because of the tendency to check secretions and slow respirations, still they should be used when the patient is losing sleep and courage, because of the constant rack of pain. So far as local applications are concerned, Herrick is in accord with most experienced practitioners in believing that they have little effect upon the course or outcome of the disease, and are to be used only for the relief of pain.

As to the fever, it should be combated by hydrotherapeutic measures, the sponge, pack, and even bath, rather than by the coal-tar products. The general public can by a little effort be educated to the use of the bath in pneumonia, as it has been to its use in typhoid fever. Bleeding is not entirely out of date, and is to-day, as formerly, a valuable therapeutic agent in selected cases.

Sears and Larrabee state that the bath treatment shows a slightly higher mortality, and, in general, the result is that the disease is not influenced by treatment.

Rheumatism. **ETIOLOGY OF RHEUMATISM.** This disease is now almost universally believed to be an infectious disease, but whether a specific infectious disease or a clinical picture which may result from the action of any one of several micro-organisms is still a matter of dispute. When one recalls the great and prolonged suffering caused by an attack of acute articular rheumatism, the great danger of

¹ Chicago Medical Record, 1908, xxiv., 264.

sequelæ which last throughout life, and the great liability of a recurrence of the disease, one realizes that the disease is more important than a consideration of the low death rate would suggest. Many clinicians have associated with the frank acute articular rheumatism certain other conditions, the endocarditis, pericarditis, chorea, and certain forms of tonsillitis, and have believed, and still believe, them all the results of the same cause. These cases prevent many points in common with attenuated septicæmia or septicopyæmia, and the more extensive one's opportunities for observation the stronger this thought becomes. When one attempts to draw sharp distinctions between the extremes of pyæmia and typical acute rheumatism, one finds so many variations and gradations that the thought that the two processes differ in degree rather than in nature easily occurs to one. Many authors have and still associate these various processes under one heading, but there has gradually been developed the idea that the infective agent of rheumatism is some specific organism. A considerable number of organisms have been advanced as candidates for the position, but of late attention has been concentrated upon a micrococcus first described by Triboulet in 1898, and by Wasserman in 1899. A very considerable mass of evidence of different kinds and from different sources has been accumulated. Paine and Poynton obtained this micrococcus in eighteen cases of acute rheumatism, and during the current year Beaton, Walker, and Ryffel¹ have published some very interesting articles in confirmation of the previous reports, and state that they agree fully with the assertion that a micrococcus is constantly associated with acute rheumatic lesions, and express the belief that the micrococcus which they found is identical with that previously found by Triboulet.

They used in their study fifteen cases, eight of acute articular rheumatism, three of chorea, and four of acute endocarditis. In seven cases the source of the culture was the heart blood obtained post-mortem; in four the urine, once the joint-fluid, three times the blood, and once both blood and urine. The organism is a tiny micro-organism arranged in pairs and short chains. There is nothing in ordinary culture methods which distinguishes this organism from other forms of streptococcus. Some have regarded it as a streptococcus, others regard it as a streptococcus so altered by its sojourn in the body as to acquire a quasi specific character—and others, as Leyden, Litten, Wasserman, Meyer, Poynton, and Paine, regard it as a specific organism. Later work reported by Walker and Ryffel lead them to the belief that this organism, which they call the *micrococcus rheumaticus*, is the specific organism of acute articular rheumatism and the allied conditions com-

¹ British Medical Journal, January 31 and September, 1903.

monly associated with it. Much of their work is extremely ingenious, and one will wait with interest their complete report.

The micrococcus rheumaticus shows the following peculiarities, sufficient in the opinion of the authors to warrant its separation as a distinct organism :

1. A color change produced in blood-agar cultures similar to the change produced by the pneumococcus and influenza, and not caused by the streptococcus.
2. The differential reaction obtained in Marmorek's test, namely, the power of growing in filtered cultures of an ordinary streptococcus.
3. The faculty of growing best in highly alkaline media.
4. The rapid production of considerable quantities of acid.

This organism has in several hands produced all the stigmata of acute rheumatism in rabbits, except chorea and the cutaneous exanthemata. Benton and Walker experimented upon seventeen rabbits with positive results. Intravenous injections of cultures caused fever, wasting, monoarthritis and polyarthritis, paresis of the legs, endocarditis, pericarditis, septicæmia, and death. Some of the rabbits had two or three attacks of arthritis following successive inoculations. They were unable to produce chronic endocarditis or chorea. Local suppuration at the site of inoculation occurred several times.

Walker and Ryffel have paid particular attention to the chemical products of the micrococcus, and their results strengthen their claims of specificity for the organism very materially. They found, for example, that the micrococcus has a hæmolytic action upon the red blood corpuscles greater and more rapid than that of any other streptococcus examined. This fact is of particular interest in view of the very marked anæmia which develops so rapidly in acute articular rheumatism.

They isolated an albumose from cultures of the organism grown in fluids originally free from albumoses, which, on injection into rabbits and guinea-pigs, rapidly caused a pyrexia of 3° F. or more, and once caused a temperature of 105° F. This observation, also, is of interest because of its possible clinical bearing, hyperpyrexia being one of the well-known manifestations of rheumatism.

The authors also draw particular attention to the fact that the micrococcus produces considerable amounts of formic acid, and that this acid, which is not normally present in the urine, or present only in mere traces, is abundant in the urine of rheumatic cases. Under salicylic acid the amount of formic acid in the urine decreases. Formic acid was obtained from the tissues of animals suffering from arthritis due to inoculation with the micrococcus.

These results are so fascinating, and there is so much correspondence between the laboratory results and clinical experience, that one is dis-

appointed to learn that Philipp¹ working in the Pribram clinic obtained only negative results. He agrees with Pribram in the belief that acute articular rheumatism is due to the action of a specific micro-organism, and is not, as Sahli and others contend, a form of sepsis due to staphylococci or streptococci. He made a careful study of twenty-four typical cases of acute articular rheumatism, taking cultures from the blood and joint fluid upon a wide variety of fluid and solid culture media, some of them containing various body fluids, both normal and pathological, such as blood serum, pleural exudate, joint exudate, ascitic fluid; but in all instances the cultures remained sterile. The blood and joint exudates were repeatedly examined by the methods now currently employed, but always with negative results. A number of lower animals were inoculated with blood and joint exudate, and always with negative results except once—in one joint of a calf.

Philipp is still firm in his belief that acute articular rheumatism is a specific infectious disease, but that new methods must be devised to demonstrate the organism. He is fully informed of the positive results obtained by others, but believes that the cases studied were not true rheumatism, but some one of the numerous forms of pseudo-rheumatism.

STATISTICS IN RHEUMATISM. McCrae² publishes a careful statistical review of 270 cases of acute articular rheumatism observed during the past thirteen years in the Osler clinic. This report is rather extensively quoted, for the reason that reports of such a long series of cases observed under the same condition are exceptional, and when found should be carefully noted as making material additions to the existing data.

The acute articular rheumatism makes up 2 per cent. of the admissions to the hospital. In contrast with this figure of 2 per cent., the report from the Montreal General Hospital is quoted. This report gives the proportion of acute rheumatism as 3.8 per cent. The figures from London are still higher, ranging from 3.5 to 7 per cent. The disease is more common in the male than in the female, in proportion of 2.7 to 1. The relation of white to colored rheumatics was 4.8 to 1, while the proportion in all admissions of white to colored is about 7 to 1. Age is an important factor, for 60 per cent. of the cases are between the ages of eleven and thirty years; 36 per cent. of the patients had some outdoor occupation; 55 per cent. of the cases occurred during the months of February, March, April, and May, and 75 per cent. during the first six months of the year. In other parts

¹ *Deutsche Archiv f. klinische Medicin*, 1903, lxxvi. 150.

² *Journal of the American Medical Association*, 1903, i. 211.

of the world, notably London, the period of greatest frequency is in the autumn months. A family history of rheumatism was given in 25 per cent. of the cases. A history of gout was obtained in but two cases. In 25 per cent. of the cases the previous history was negative, while 45 per cent. gave a history of a previous attack of rheumatism. *Tonsillitis* is recorded in but ten instances, chorea in seven instances. The small number of recorded instances of tonsillitis is remarkable and at variance with both current opinion and personal experience. The percentage of cases giving a history of distinct and repeated attacks of tonsillitis is high; 52 per cent. of the cases entered with their first attack of rheumatism; 26.6 per cent. with the second; 9.6 per cent. with the third; 3.7 per cent. with the fourth.

The age at the first attack is known in 255 cases. Three-quarters of the cases occurred during the first three decades; 11 per cent. after the fortieth year.

The onset followed exposure in 12 per cent. of the cases. Joint changes were the first symptoms in 82 per cent. of the cases. Chills occurred in 6 per cent. of the cases. Tonsillitis in but ten cases.

Arthritis. The knee was involved more often than any other joint, 53 per cent.; the ankle next, in 33 per cent. The leg was involved more often than the arm, in proportion of 4 to 3. Next after the ankle comes the shoulder, wrist, elbow, hip, hand, and foot. In the legs the joint changes are more often bilateral, while in the arms more often unilateral. *Fever* lasted on an average twelve days. In some cases it ended shortly after admission, after an indefinite duration previous to entrance. In twenty-six cases the fever lasted more than four weeks, and twice lasted ten weeks.

The fever presents the two types which have been previously noted: one in which the temperature averages over 103° F. for a few days, and then falls rapidly to normal, and another in which the temperature does not rise as high, but lasts much longer.

So far as the *heart* is concerned, McCrae divides the cases into three groups: those in which the heart sounds are normal; those in which there is certainly an organic lesion, and those in which it is uncertain whether the heart is involved or not; 38 per cent. are included in the first group; 32 per cent. are placed in the second. In this second group 95 per cent. showed mitral lesions; 23 per cent. aortic, and 18 per cent. both. This is practically the same percentage of mitral cases as in the series from the St. Thomas Hospital—97 per cent.—but it is higher, nearly twice as high as the percentage of aortic cases given—23 per cent. as compared with 12 per cent. Of 85 cases with valvular lesions, 54 showed mitral insufficiency, 3 mitral stenosis, and 8 both stenosis and insufficiency. Mitral insufficiency with aortic insuffi-

ciency occurred twelve times; mitral insufficiency and aortic stenosis once; mitral stenosis and aortic insufficiency, once. There were two cases in which double mitral and aortic lesions were diagnosed, and only four cases of pure aortic insufficiency. This gives a percentage of 4.7 per cent. for pure aortic lesion. The St. Thomas figure is 3 per cent.

The group of doubtful cases is much more important. They numbered 78, or 28 per cent. At the date of discharge sixty showed cardiac murmurs, the nature of which was doubtful. The other eighteen cases had shown murmurs sometimes during the course of the disease, but at the date of discharge showed none. It may be stated that practically the only sign of cardiac involvement was the murmur. The heart was not enlarged, there was no thrill, and the second pulmonary sound was not accentuated. The largest subdivision of the sixty includes the twenty-four cases in which the first apical sound was accompanied by a soft murmur, which was not transmitted, and without accentuation of the second pulmonary sound. Three other cases were like these, except that the second pulmonary sound was accentuated. In three cases the second pulmonary sound was reduplicated at admission, but not later. Six cases showed a soft murmur transmitted to the axilla. In eight cases the murmur was not transmitted to the axilla, but was heard over the entire cardiac area. Of the eleven cases in which a murmur was heard over the base or only over the pulmonic area, one would incline to the opinion that the murmur arose outside of the heart. It was impossible to determine with certainty the nature of the apex murmur in the forty-nine cases in which it was heard. Some in whom the murmur was thought to be functional (accidental is the better word) returned with well-characterized heart lesions, and others in whom it seemed probable that a lesion had developed returned with the heart normal and the sounds clear.

The conditions occurring in the course of acute rheumatism which may cause *heart murmurs* are: (1) fever; (2) toxæmia; (3) anæmia; (4) myocarditis; (5) dilatation; (6) endocarditis. The first two are operative during the first stages of the disease, and may cause murmurs which later disappear. Anæmia can cause murmurs, but not permanent ones. Myocarditis is a possible effect of the rheumatism, probably a commoner effect than is realized, but can cause murmurs only by dilatation or by muscular inco-ordination, so that the so-called muscular insufficiency of the mitral shows. Dilatation can cause murmurs, but certainly no marked degree could exist without detection, and murmurs resulting from it would not be permanent. Endocarditis is certainly the most important cause. The resulting vegetation may be small and undergo partial resolution, thus making the defect less, or,

perhaps, causing its disappearance. When doubtful keep the patient in bed and at rest.

The influence of age of the patient at time of first attack is a well-known factor in the development of endocarditis, and is well shown by the following table :

| Age at first attack. | Heart clear. | Organic lesion. | Doubtful. |
|----------------------|--------------|-----------------|--------------|
| 1-10 | 18 per cent. | 64 per cent. | 18 per cent. |
| 11-20 | 37 " | 40 " | 23 " |
| 21-30 | 46 " | 18 " | 36 " |
| 31-40 | 41 " | 12 " | 47 " |
| 41-50 | 60 " | 24 " | 16 " |
| 51-60 | 25 " | 37 " | 38 " |

Pericarditis occurred in sixteen cases—i. e., 5.9 per cent., agreeing closely with the St. Thomas figure, 6.1 per cent. Six of the patients were under twenty and over ten years of age. Three were suffering from their first attack of rheumatism, seven from the second, and five the third. The earliest date of onset was the fifth day, and the latest the sixty-first day.

Adherent pericardium was found in but six cases, and three of these developed under observation.

Pulse generally slower than might be expected. In 59 per cent. of the cases it did not rise over 100, and in only three did it pass 130, and in but fourteen was it over 120. More than half of these were cases of pericarditis. The development of an endocarditis does not by any means always accelerate the heart's action.

Urine. Albumin in 34 per cent. Casts were found in a number of these cases. Quantitative estimation of uric acid in some cases showed no variation from the normal.

Blood. Average hæmoglobin in seventy-seven cases, 65.9 per cent.; the average leukocyte count was 11,776. A differential count was made in eleven cases, and was practically normal in all.

Duration. Average stay in hospital, 26.4 days.

Cultures were practically negative. Cultures from the joints, blood, and urine yielded nothing. All cultures made in the line of the work of Achaline were negative.

Treatment was the usual routine. Mortality, 1.1 per cent.; all the fatal cases had endocarditis and pericarditis.

During the year several new modifications of salicylic acid have been described, but there has been no real advance in the treatment of this most refractory disease. Sigel, an assistant of Ewald, makes an enthusiastic report upon *rheumatin*, a combination of salicylic acid and quinine, based upon a study of forty cases of acute and chronic rheumatism. *Rheumatin* is an odorless, tasteless powder, only slightly soluble in water, and readily taken in doses of thirty to ninety grains per

day. Salicylic acid appears in the urine in from one to two hours after administration. Both temperature and pain were promptly lessened, and no disagreeable by-effects were noted. No cardiac, renal, or gastrointestinal disturbances were experienced, and no tinnitus aurium or dizziness was noted.

Rheumatin is recommended particularly in cases of rheumatism with cardiac or renal complication and in cases where other salicylic acid preparations are badly borne, and in subacute and chronic cases, where for any reason a change of medication is desirable.

Scarlet Fever. ETIOLOGY OF SCARLET FEVER. This disease, which is now without question the most important of the infectious diseases of childhood, has been the subject of considerable work during the year, but mainly along two lines. The relation of the streptococcus to scarlet fever has been assiduously studied, especially by Hektoen, Weaver, and Ruedinger, and with the result that their work does not support the idea that scarlet fever is due to a streptococcus. These contributions are the most important of the year, although those of Baginsky and Escherich upon the therapeutic effects of antistreptococcus serum are more apt to attract attention.

Hektoen's¹ work covers the blood examination of one hundred cases of scarlet fever. The blood in all these cases was examined for bacteria during life, and this is probably the reason why his conclusions differ so greatly from those of Baginsky, Sommerfield and others, who have concluded that scarlet fever is due to a streptococcus. Such examinations of the blood have been made by numerous observers, and while streptococci have been found during life in a certain percentage of cases, they are far more frequently wanting. After death the frequency with which streptococci are found is very greatly increased. Baginsky and Sommerfield, for example, found them in the heart's blood and internal organs of eighty-two fatal cases of scarlet fever. They were unable to differentiate the streptococcus isolated from the ordinary pathogenic streptococci. The serum from convalescent patients had no agglutinating action upon the streptococci isolated and had no protective action upon rabbits inoculated with streptococci. Slawyk's experiences are in marked contrast with these. Of 98 fatal cases of scarlet fever only 52 yielded cultures from the blood after death. Streptococci were found forty-five times, six of these in combination with the staphylococcus; three times only the staphylococcus, and four times the pneumococcus. Examinations of the blood during life in 72 cases were positive in 7 cases, four times the streptococci and four times the staphylococci. Examination of the blood of fatal

¹ Journal of the American Medical Association, March 14, 1903.

cases of measles and diphtheria showed the streptococci in 22 and 20 per cent. of the cases respectively.

Combining the reports of Babes, Raskin, Pearce, Wright, Baginsky and Sommerfield, Slawyk, Moser, and Lordon we find that streptococci, alone or in combination with the staphylococci, were found in the blood and organs of 227 of 392 cases—*i. e.*, 57.7 per cent. This shows the great frequency of the streptococcus infection in fatal cases of scarlet fever, and, while it does not warrant the assumption that scarlet fever is the result of the action of a specific streptococcus, it suggests very strongly that secondary infection with the streptococcus is the determining cause of death in many fatal cases, and that the still unknown infective agent of scarlet fever finds in the streptococcus an active synergistic organism.

During life the percentage of positive results from examinations of the blood for bacteria is very decidedly smaller. Combining the results of Slawyk, Lemoine, Klein, d'Espine, Mery, Seitz, and Hektoen, we find that in 237 cases streptococci were found in 25—*i. e.*, only a little over 10 per cent. of the cases examined. Considering particularly the one hundred cases examined by Hektoen, not only because they make the longest series examined by any one observer, but more particularly because the work has been done since the introduction of improved methods, which give a larger percentage of positive results, we find that streptococci were found in 12 per cent., practically the same figure which was obtained from the combined reports.

The relation of the severity of the disease to the streptococcaemia is shown by the following table:

| | Mild | Mod. severe. | Severe. | Total. | Total. |
|-----------------|-----------|--------------|------------|--------|------------|
| Total number, | 55 | 40 | 11 | 4 | 100 |
| Streptococci in | 4 | 5 | 3 | 0 | 12 |
| | 9 per ct. | 12.5 per ct. | 27 per ct. | 0 | 12 per ct. |

In only one case was a culture obtained later than the seventh day, and ten of the positive results were obtained during the first five days of the disease, and only one of these ten was on the first day. The first culture made was positive in eight cases, the second in three, and the third in one case. The percentage of positive results is somewhat higher in adults than in children, probably because in the children only one venous puncture was made. The streptococcaemia is of very short duration—a fact which in part accounts for the low percentage of positive results. As regards the genesis of the general infection, Hektoen believes that the angina furnishes the atrium of infection. This very natural assumption is strengthened by reference to the percentage of positive results in the blood cultures in mild and severe cases, 9 as compared with 27 per cent.

In discussing the relation of the streptococci to scarlet fever Hektoen points out that the failure to demonstrate the streptococci in so large a majority of the cases, even the severe ones, and the appearance of these organisms late in the disease, although sought in vain earlier in the course of the disease, make it probable that the streptococcus infection is secondary rather than primary. Those who have assumed that the streptococcus is the causal organism have relied mainly upon the large percentage of cases in which the streptococci were obtained from the blood or internal organs after death. The significance of this observation is much lessened by the fact that in many other conditions, notably diphtheria, measles, and smallpox, this same organism is found very frequently in the blood and internal organs. It seems reasonable at present to believe that in this disease there is a double infection of the oropharyngeal cavity, both the streptococcus and the yet unknown specific organism of scarlet fever.

Weaver¹ has made a bacteriological study of the skin and throat in cases of scarlatina. The work has been carefully done, and without entering into a discussion of the methods, the conclusions may be quoted. He found the same bacterial flora upon the skin and in the throat of cases of scarlet fever as those found in health, and no one organism was constant except the streptococcus in the throat. He found that it was impossible to identify the organisms found except by complete study of pure cultures. The streptococcus was found on the tonsils of almost all cases in enormous numbers. Aside from the positive value of these studies, one must insist, as Weaver does, upon the danger of drawing conclusions from the mere appearance of an organism and identifying it without complete study. The results point still further to the idea that the streptococcus is an important factor in the clinical picture of scarlet fever, but lend no support to the claim that it is the specific organism.

Weaver,² in a later article, enters more particularly into a description of the streptococci found in the throat, and confirms, what others have stated, that the streptococci from scarlatinal anginas are not different from streptococci from other sources so far as cultural and morphological peculiarities are concerned. In regard to the agglutinating reactions, it may be stated that Baginsky found scarlatinal blood serum without agglutinating action upon streptococci, but Moser states that his serum, to which fuller reference will be made later, agglutinates streptococci from scarlatinal cases in a very different manner from other streptococci. Weaver and Ruedinger³ have also studied the

¹ American Medicine, 1903, v. 609.

² Journal of Medical Research, 1903, ix., No. 3.

³ Medicine, 1903, 515.

effects of the serum of scarlet fever patients upon the streptococci. The serum was obtained by venous puncture from the first to the sixteenth day, and inoculated with streptococci. Parallel experiments were made with the blood of normal individuals. The results of the two series were the same, and neither sera showed any bacteriolytic effect upon the streptococci.

All of these observations go to strengthen the idea that the streptococcus obtained so often from the bodies of those dying from scarlet fever is nothing but the common streptococcus, and not the specific organism of scarlet fever. This conclusion is still further strengthened by an article by Hasenkopf and Salge.¹

Except for these articles and those upon the serum treatment of scarlet fever, to which reference will be made later, little has appeared. A few reports of unusual complications and a rather careful comparison of the urine of scarlet fever and diphtheria constitute the literature.

THE URINE IN SCARLET FEVER AND DIPHTHERIA. Lahdé, in a Paris thesis of 1903, compares the urine of scarlet fever and diphtheria. In both the urine is reduced in amount, although the reduction is proportionate to the decrease in the amount of fluids taken. With scarlet fever the oliguria lasts longer during the first six days of the eruption, and ends with a sudden increase about the eighth to tenth day, while in diphtheria the smallest excretion is on the day of entrance, and then gradually rises to a maximum on the tenth day. Here as elsewhere the specific gravity is the inverse of the quantity of urine. In both diseases the acidity is increased. The minimum excretion of urea in scarlet fever is on the fifth day of the eruption. It then suddenly increases and then gradually falls again. In diphtheria there is often a large excretion of urea the first day. Urobilin and indican are rarely found in the urine of scarlet fever, but are constantly found in diphtheria. The *diazo reaction* is frequently present in the urine of scarlet fever, but constantly absent in diphtheria. Lahdé does not enter into any discussion of the frequency of albuminuria and casts in these diseases, although both these factors are more important than any of those considered.

PURPURA HEMORRHAGICA FOLLOWING SCARLET FEVER. While hemorrhagic scarlet fever is rare, even more rare is the development of a purpura hemorrhagica during the convalescence. Cullen² reports the case of a boy aged twelve years in whom such an eruption appeared. It was preceded by joint pains and high fever. The hem-

¹ Jahrbuch f. Kinderheilkunde, 1903, 218.

² British Medical Journal, January 24, 1902.

orrhagic spots were particularly numerous over the legs. *Anæmia* developed rapidly, and death occurred on the fifth day after the beginning of the eruption. Biss¹ reported a similar case in which, however, the course was even more rapid, and hemorrhages appeared from the mucous membranes as well as from the skin, in the shape of *malæna* and *hæmatemesis*. When one considers the condition of the throat in scarlet fever, and the ease with which such a throat might and does lead to infection of the general organism with the streptococci and other bacteria frequently present in the throat, one must be surprised that these symptoms, which are nothing more than the evidences of severe sepsis, are as rare as they are.

DIAGNOSIS OF SCARLET FEVER. So far as the diagnosis of scarlet fever is concerned, nothing has appeared during the year except an article by Bäumler, and while it contains nothing new the material is conveniently grouped and is reproduced for this reason. It contains no mention of the differentiation of diphtheria and scarlet fever, and yet, so far as my personal observation goes, these two diseases are more frequently confused than any of those in Bäumler's tables. The error made is not in calling a case of diphtheria one of scarlet fever, but *vice versa*. The tonsillitis, often membranous and ulcerative, is mistaken for a diphtheria, and the scarlet eruption overlooked or disregarded. Whenever such a throat is seen the diagnosis can be made only by means of cultures made from the throat, and yet a very large number of these cases are scarlet fever with membranous angina rather than instances of mixed infection.

Bäumler's table, which is published in the *Deutsche Klinik*, 1903, Band ii., p. 590, is as follows :

| GERMAN MEASLES. | | MEASLES AND SCARLET FEVER. | |
|-------------------------------------|--|---|--|
| | <i>German Measles. Rötheln.</i> | <i>Measles.</i> | <i>Scarlet Fever.</i> |
| Incubation period. | 17-21 days. | 9-11 days. | 1-7 days, and more. |
| Prodromal symptoms before eruption. | Usually none. | Fever, catarrh of upper air-passages and conjunctiva. | Vomiting, sore throat, fever, rapid pulse. |
| Eruption appears. | First day. | Fourth day. | Second day. |
| Progression. | First on face, upper and lower lips covered with eruption. | First on face, upper and lower lips covered with eruption. | First on neck and upper part of chest, on the face, but the region about the mouth remains free. |
| Character. | Flecks and points, clear red. | Flecks, quickly becoming somewhat elevated, prominence of the skin follicles, bluish-red color. | Very fine punctate, close together on diffusely red skin. Bright red. |

¹ *Lancet*, August, 1903.

| GERMAN MEASLES. | | MEASLES AND SCARLET FEVER. | |
|--|---|--|---|
| <i>German Measles.</i> | <i>Rötheln.</i> | <i>Measles.</i> | <i>Scarlet Fever.</i> |
| Exfoliation. | Slight and in fine scales. | Fine. | On neck and body, fine on hands and feet; often, only after weeks, in large shreds. |
| Accompanying typical symptoms in neck. | Catarrhal redness. | At first red flecks, later general redness (on cheeks, Koplik's spots). | General, marked redness with more or less marked swelling, and sometimes follicular flecks or even membranes, complication with diphtheria. |
| Respiratory organs. | Sometimes mild catarrh. | Severe catarrh, laryngitis, bronchitis, marked disposition to bronchopneumonia. | |
| Spleen. | Somewhat enlarged. | No enlargement. | Enlarged. |
| Lymph glands. | Superficial, cervical, auricular, and often other glands enlarged, soft, and may be tender. | Not so constant. | Glands, especially those under angle of jaw, cervical glands, later as a complication, often with suppuration. |
| Fever. | Often none, or very little, rarely reaching 39° C. (102.2° F.) on 1st day. | Three days of prodromal fever. Increase with spread of eruption. Both at maximum at same time. | Highest fever at onset. |
| Ending. | Lysis. | Crisis. | Lysis. |
| Complications and sequelæ. | Generally none. | Bronchopneumonia, otitis media, the bronchial glands or lungs, general miliary tubercle, noma, diphtheria, rarely nephritis. | Endocarditis, acute rheumatism, nephritis, otitis media, septicopyæmia. |

SERUM TREATMENT OF SCARLET FEVER. The experiments previously referred to in which it was found that the blood serum of patients convalescing from scarlet fever had no effect upon streptococci and did not protect rabbits subsequently inoculated with streptococci prepares one for the negative results obtained by Scholz and by Rumpel in the treatment of scarlet fever with the blood serum of convalescent patients. Scholz¹ used from 5 cm. to 20 cm. of the blood

¹ Fortschritte d. Medizin, 1903, No. 11.

serum of convalescent scarlet fever patients in nine cases of mild scarlet fever, and found that while the injections did no harm they also had no beneficial effect.

Rumpel,¹ whose experience is wider, covering as it does thirty-nine severe cases, comes to the same conclusion. The mortality in these cases was 59 per cent., and the injection of the serum had no effect upon the fever, the duration of the disease, or the frequency of complications.

In the latter part of the year 1902, too late for mention in the last volume of *PROGRESSIVE MEDICINE*, Baginsky² published an important article upon the use of antistreptococcus serum in scarlet fever. Baginsky, as is generally known, has been a prominent champion of the idea that scarlet fever is the result of streptococcus infection. His opinion is based upon observations extending over ten years. He has examined the pharynx of 701 cases of scarlet fever, and found the streptococci in all but five of them, usually associated with the staphylococcus or the diplococcus. He found them in the blood and organs of 100 cases of fatal scarlet fever. Baginsky began the use of the Marmorek antistreptococcus serum as soon as this frequent association of the streptococci with scarlet fever was noted, but the serum proved to be of no value. Later a serum prepared by Aronson was used. Baginsky prefaced the statement of his results by drawing attention to the great difference in the scarlet fever mortality from year to year—varying between the years 1893 to 1902, from a maximum of 34.8 per cent. to a minimum of 12.4 per cent. He used the Aronson serum in a series of sixty-two cases with a mortality of 11.3 per cent., while sixty-three cases treated at the same time without the serum showed a mortality of 17.3 per cent. Such a difference in so small a series of cases does not furnish grounds for encouragement. There was no appreciable effect upon the general condition or upon any one of the symptoms. Later on, because of a series of four cases in which the serum had an apparent unfavorable effect upon the case, the use of the serum was discontinued.

Escherich, in Vienna, using a serum prepared in quite a different way obtained results which, while not convincing, are sufficiently encouraging to lead to continued effort along the same line. The serum used differs from that of Marmorek and Aronson in that the streptococci used in immunizing the horse were taken directly from the human and used without raising their virulence by passage through the lower animals. The serum differs also in this, that the animals were immu-

¹ *Arztl. Verein in Hamburg*, 1902, xii. 26.

² *Berliner klin. Wochenschrift*, 1902, 1113.

nized by cocci from various sources instead of a single source. Very large amounts of serum were used—from 100 to 200 c.c.

The report is based upon 112 cases treated in the St. Anna Children's Hospital in Vienna. In from four to twelve hours after the injection the toxic symptoms are manifestly influenced, the temperature falls 2° C. or more, the pulse and respiration slow down, the stupor and delirium disappear, the general condition improves, and the exanthema begins to pale. In favorable and uncomplicated cases the temperature does not again go up, and by the next day the rash is gone. The effect is less positive in more severe cases or in those in which too little serum or one of poor grade has been used.

The serum causes transient exanthema in about 75 per cent. of the cases similar to those following the use of large amounts of the diphtheria serum.

The effect of the serum upon the infectious symptoms, such as the changes in the throat, nose, and lymph glands, is less marked, and yet if the serum is used early and in sufficient amounts these symptoms are less frequent and less severe. Since the use of the serum ulceration of the throat and suppuration of the cervical glands have been less common. The course of the scarlet fever is more nearly that of a normal scarlet, and the complications are less frequent.

So far the report would lead one to expect a great reduction in the mortality, and yet there is not much difference between the mortality of those treated with the serum and those without. Encouragement comes when one compares the results in the cases injected early with those injected late. Of 27 cases injected during the first forty-eight hours of the disease none died; 2 of 27 injected on the third day died; 4 of 23 injected on the fourth day, and 6 of 20 injected on the fifth day, a mortality ranging from nothing during the first and second day, through 7.4 per cent. and 17.4 per cent. on the third and fourth days to 30 per cent. on the fifth day. The mortality in cases injected on the ninth day was 50 per cent.

These reports are certainly more encouraging than that of Baginsky, but in view of the growing evidence that the streptococcus occupies only a secondary position in the causation of scarlet fever, and in consideration of the fact that serum prepared in this way—using as they do streptococci from a variety of sources—must vary in its composition, one must be even more than ordinarily careful in drawing conclusions.

TREATMENT OF SCARLATINAL NEPHRITIS. Of the various complications of scarlet fever there is none which is more to be feared than the nephritis. Not only does this add to the immediate mortality, but it has in its possibilities for future trouble which add to the reasons for this fear. Anything, therefore, which gives promise of lessening this

danger is worthy of attention. The report of Widowitz upon the use of *urotropin in scarlet fever* is such as to lead to a note upon it.

The beneficial effects of urotropin upon cystitis and pyelitis observed by so many led Wiodowitz¹ to see what the effects of this drug would be in cases of scarlet fever. During the last three years he has employed the urotropin in 102 cases of scarlet fever, and in no one of them has there been any nephritis. The dose varied with the age of the patient, and was given for three days at the beginning of the sickness and for three days at the beginning of the third week, the period at which nephritis is most liable to develop. These results are remarkable, and while the series of cases is not large nephritis is so common a complication, varying from 16 to 90 per cent. in different epidemics, that a series of 102 cases without nephritis strongly suggests that the treatment rather than good fortune is at the bottom of it. At any rate, urotropin is harmless in proper doses, and the question can be easily settled by further trial.

Sleeping Sickness. Mention is made of this disease not because of its having any direct interest for the American profession, but because the work of the year has made it probable that this disease is due to a form of *trypanosoma*, thus introducing into human pathology a new parasite. There have been a few instances during the last year of trypanosomiasis, but the subject did not attract very serious attention until Castellani reported his discovery of the *trypanosoma* in the cerebro-spinal fluid of cases of sleeping sickness.

Wiggins, in the *Lancet* of December 13, 1902, reports his failure to find the *filaria perstans* in the blood of 150 cases of this disease. The most direct sign of the disease is the expression of the patient. The disease runs a well-defined course of from four to five months. At the end of the first month the patient presents a vacant expression, with a characteristic drooping of the lower lip. By the end of the second month the patient is listless, the face puffy, and the upper eyelids droop. By the end of the third month these symptoms are intensified, the saliva drips over the hanging lip. The body is dirty. There is a tremor in all the limbs, particularly the arms. At the end of the fourth month the patient can no longer get about. During the fifth month sores develop over the body. The eyes are closed, and the patient is unable to speak. Death follows in two to four weeks.

Emaciation is rapid; the pulse quickens; the temperature is normal or subnormal; the superficial glands are enlarged in a number of cases.

Samson, in the *Journal of Tropical Medicine*, July 1, 1903, has a most interesting article upon the sleeping sickness, in which he reviews

¹ Wiener klin. Wochenschrift, 1903, 1103.

the symptoms, pathology, epidemiology, and the various theories as to the cause. He dismisses Manson's suggestion of the filaria perstans as the cause, because the sickness is found in certain parts of the world where the filaria is exceptional, and *vice versa*.

The last suggestion is that of Castellani, who found in the cerebro-spinal fluid, obtained by spinal puncture during life, trypanosoma in twenty of thirty-four cases examined.

The discovery of the trypanosoma in sleeping sickness suggests a very definite line of research with regard to the etiology, epidemiology, and prophylaxis of this fearful disease. We know that trypanosoma infection may be by direct contact or through the intermediation of blood-sucking insects—fleas, lice, and flies. The well-demonstrated relation of the tsetse fly to the causation of trypanosoma disease in cattle suggests strongly the possibility and even the probability of some variety of this fly being the agent of inoculation and bearing the same relation to these infections which the anopheles do to the malaria, and this suggestion is strengthened by the fact that the tsetse fly is common in parts where the sleeping sickness occurs.

Tetanus. Because of the frequency with which this disease has followed certain injuries, the blank cartridge injury and certain therapeutic measures—the gelatin injections—it has received a very considerable amount of attention. Reviews of series of cases and of methods of treatment have appeared which alter the general idea of the disease in some respects, and enable one to form some opinion of the value of the therapeutic measures now currently employed in its treatment. The disease is so terrible in its manifestations and so frightful in its mortality that it strikes the attention always. In addition to this it seems that the disease is becoming progressively more and more frequent.

G. W. Norris¹ reports a study of fifty-seven cases in the records of the Pennsylvania Hospital, covering the period from 1874 to 1902. For some reason, although Norris is unable to give any explanation, no cases are recorded between the years 1886 and 1893. The mortality in this series is 48—i. e., 84.2 per cent. This percentage is not as high as is found in some other reports, but is high enough. Norris notes that the site of the injury appears to have some influence upon the mortality, for injuries of the head and neck show a mortality of 100 per cent.; those of the lower extremities gave 89.5 per cent.; those of the arms 70 per cent., while those of the trunk, of which only one case is recorded, and mixed injuries of which there are seven, showed no deaths. Why this should be is not apparent, and one cannot but

¹ Philadelphia Medical Journal, 1903, 835.

think that were the series larger these apparent differences would be obliterated.

Age seems to have some influence, for all patients under ten or over fifty years died, while the mortality between the ages of ten and fifty years averaged approximately 71 per cent. This effect of age is not peculiar to tetanus, for it is apparent also in the mortality tables of most other diseases.

Yandell's dictum, that if a patient lived more than five days there is good hope of recovery, is still generally held, and it is, therefore, interesting to note that of forty-one cases in which the day of death is noted only sixteen died during the first five days, and ten died later than the twelfth day.

It has long been believed that the longer the *period of incubation* lasts the greater the probability of recovery. Norris enters carefully into this point, but the figures vary so that they cannot be briefly summarized, and Norris' table is therefore reproduced:

| | | | | | | | | | | | | | | |
|------------------------------|---|-----|-----|----|-----|-----|----|----|-----|----|-----|-----|----|----------|
| Period of incubation . . . | 1 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 12 | 14 | 16 | 18 | 20 | Unknown. |
| Number of cases | 1 | 2 | 1 | 9 | 8 | 4 | 6 | 5 | 1 | 3 | 1 | 1 | 2 | 14 |
| Mortality, per cent. | 0 | 100 | 100 | 67 | 100 | 100 | 88 | 20 | 100 | 66 | 100 | 100 | 50 | 95 |

There are a number of items in this table which excite one's curiosity, and from the nature of the material which furnishes the basis of the report that curiosity, probably, cannot be satisfied. Why five cases with an incubation period of ten days should show a mortality of but 20 per cent. while six cases with an incubation period of nine days gave a mortality of 83 per cent., is difficult to see. One case is said to have had an incubation period of one day, and to have nevertheless recovered, exciting suspicion that either the incubation period is wrongly stated or the diagnosis incorrect. In many injuries it is impossible to determine the incubation period, as is illustrated by a recent personal experience. A child had been vaccinated, and upon the eighteenth day developed symptoms of tetanus, and died the following day. It is easy to assume that the infection occurred at the time of the vaccination, and yet the source of the vaccine was known, and no other case occurred among the several thousand children upon whom the vaccine was used, and clinical experience is that a tetanus of such a long incubation period as eighteen days does not kill in twenty-four hours.

Norris' table in a general way supports the current idea of the influence of the duration of the incubation period upon the mortality. Twenty-five cases with an incubation period of one week or less give a mortality of 86 per cent., while twenty-three cases with an incubation period of over one week give a mortality of 69 per cent.

According to these cases the nature of the wound has not as much influence as is currently supposed, and incised wounds, which might be expected to give the lowest mortality, gave a mortality of 100 per cent., lacerations and contusions 87.5 per cent., and punctured wounds 92 per cent.

So far as treatment is concerned, forty-seven were treated symptomatically and gave a mortality of 87 per cent.; seven were treated with carbolic acid with a mortality of 85 per cent., and three were treated with the tetanus antitoxin, and one of these recovered.

GELATIN INJECTION A CAUSE OF TETANUS. Since the introduction of the subcutaneous injection of solutions of gelatin for the control of hemorrhage from vessels which could not be reached, the practice has become quite general, and while I believe there is still room for discussion of the actual value of this measure, there is no getting away from the fact that this use of gelatin is associated with some danger. Chauffard,¹ in April of this year, published a collected report of eighteen cases of tetanus which had followed the use of gelatin as a hæmostatic. Dieulafoy shortly afterward published an additional case, and makes the statement that up to the time of his report twenty-three cases had been recorded. Krug² reports a further case following an injection of gelatin given to stop hemorrhage from a bleeding tooth. Krug collects five other fatal cases, and one in which recovery took place. Kuhn had a case in which the symptoms developed twelve hours after the injection, and ended rapidly in death. The onset was so rapid and the symptoms so severe in this case that one must suspect that the tetanus toxins were injected with the gelatin rather than produced by infection.

There are two striking things about these reports: one is that in all cases the injections have been used for the stopping of profuse or repeated hemorrhages, and the other is that they are all foreign reports. The gelatin injections have been used extensively both here and abroad in the treatment of aneurysms, and yet, so far as I know, tetanus has never followed its use for this purpose. Why this should be is not apparent, but it is natural to suggest, as Chauffard has done, that the vitality and resistance are so lowered by hemorrhage that the individual is unable to cope with an infection which he would otherwise be able to conquer.

I have not seen any reports of death following the use of gelatin in this country, but know from a verbal report that at least one such death has occurred. This difference in experience may be due to some difference in the method of manufacturing the gelatin in this country,

¹ Bulletin de l'Académie de Médecine, Paris, April 7, 1903.

² Therapeutische Monatshefte, June, 1903.

but one should profit by the European experience, and be elaborately careful in the preparation of gelatin solutions for subcutaneous use. The necessity for such great care is clearly indicated in an article by Levy and Bruns.¹ These investigators found the tetanus spores in eight of thirteen specimens of gelatin purchased. It is generally stated that the tetanus spores are destroyed by exposure to 100° C. (212° F.) for eight minutes, but Levy and Bruns found this time insufficient, and that at least thirty minutes' exposure to full 100° C. (212° F.) is necessary to kill all spores. They found, also, that in a flask containing 200 c.c. to 500 c.c. of gelatin solution the central parts of the solution never reached the point of 100° C. (212° F.) when the solution was heated on a water-bath, and that in a steam sterilizer it took from twelve to fifteen minutes before the solution reached a uniform heat of 100° C. (212° F.). Their experiments lead them to advise the sterilization of the gelatin in small flasks in a steam sterilizer, the exposure to last forty minutes after the solution has reached 100° C. (212° F.). They also advise against heating the gelatin to a point above 100° C. (212° F.), because it probably alters it in such a way as to lessen its effect upon the coagulability of the blood.

Anderson, in Bulletin 9 from the Hygienic Laboratory in Washington, states that he found tetanus spores in one out of seven samples of gelatin examined. He suggests sterilizing the gelatin by the fractional method on three successive days. The preparation of these solutions of gelatin requires so much time and care that they should be kept in stock ready for use.

FOURTH OF JULY TETANUS. H. G. Wells, of Chicago, who has published a number of articles upon tetanus following Fourth of July injuries, sounded, in an article appearing in June, a note of warning which was unfortunately not heeded, and the predictions there voiced were more than fulfilled. While Wells has been especially concerned with conditions in Chicago, he quotes figures from New York and Washington reports which show that the same conditions prevail there. A consideration of the reports shows that there is a seasonal increase in tetanus mortality during the summer, but the month of July furnishes 38.7 per cent. of all the year's deaths from traumatic tetanus. From June 25th to July 14, 1900, there were twenty-seven deaths in Chicago from traumatic tetanus, all due to blank-cartridge wounds, except one which was due to a toy cannon.

It would naturally occur to one that there must be something about the cartridges themselves which carried the tetanus bacilli, but repeated investigations of many cartridges have failed to show them. The

¹ Mittheilungen aus d. Grenzgebieten der Medizin und Chirurgie, 1902, x., 235.

common street dirt is, however, richly infected, and it is probable that the dirt on the hand at the time of injury—and it is usually the hand which is injured—furnishes the infective agent. This dirt is carried deeply into the torn and lacerated tissues, where the bacilli find the conditions most favorable for their growth; where we find repeated clinically the experiment of Strick, who showed that one one-thousandth part of the ordinary fatal dose of tetanus bacilli will kill a rabbit when injected into a hæmatoma.

In view of these facts a blank-cartridge wound is to be regarded as a serious and dangerous injury, worthy of the most painstaking and careful surgical treatment. The wound should be opened widely and deeply. All foreign material should be removed; the entire surface of the wound should then be cauterized and packed in such a manner that no dead spaces in which hæmatoma can form are left. In addition to all this, an immunizing dose of at least 5 c.c. of tetanus antitoxin should be given, for while the therapeutic value of this antitoxin is very questionable, all agree that it has a high immunizing value and that its use at the time of injury in cases where tetanus might reasonably be feared will prevent most cases.

That this warning, sounded by Wells and ably seconded by the united medical and lay press, was not heeded is shown by the special article appearing in the *Journal of the American Medical Association*, August 29th. Here are assembled the reports of the Fourth-of-July injuries of all sorts from the entire country, but only those followed by tetanus are numbered, and the tetanus cases total 415. It is more than probable that this figure is too small rather than too large. The information is in many cases very incomplete, but there is the important fact that 415 cases of tetanus followed a perfectly senseless method of celebrating the Fourth.

The cases were not evenly distributed over the country, the South escaping almost entirely, while certain of the Northern States, such as Pennsylvania and Ohio, had more than their proportion. As would be expected, the great majority of the cases are among the small boys, and this year, as in other years, the blank cartridge is the cause of most of the wounds, although there are a number due to the giant firecracker and the toy cannon.

The *incubation period* in most of these cases has been short, although the tables give no data upon this point, and the number of days given in most instances means the interval between the receipt of the injury and death. The average duration in 279 cases in which this is stated is twelve days, and this, it must be remembered, includes the incubation period and the entire course of the disease. The minimal figure is four and the maximal twenty-six.

The mortality is fearfully high, for only seven are reported as entirely recovered, although it is probable that this is not all the recovered cases. The mortality may be placed with probability at from 90 to 95 per cent.

The duty of the medical profession in this matter is clear and is two-fold. One part of the duty has been well done, although efforts must not stop. The public has been warned of the great danger associated with the use of blank cartridges, and while the public does not appear to have availed itself of this information the medical profession cannot be blamed. At the same time it should continue its educational efforts. In another respect, however, the profession is itself blameworthy, as is shown by the fact that many of these injuries were seen by the doctor and dressed, but not dressed properly, not dressed as they would be by one who appreciates and fears the dangers of tetanus. If every one of these injuries were dressed in the manner outlined in one of the earlier paragraphs and the patient immunized with antitoxin, the cases of tetanus would be very greatly reduced in number. So long as cases remain improperly treated the profession must be censured.

In this connection an experience of Bair¹ is interesting. He made cultures from tissues dissected from a wound caused by a blank cartridge and regained the tetanus bacillus. This patient did not develop tetanus, and yet it is easy to see what would have happened if Bair had treated the wound in a careless way.

THE TREATMENT OF TETANUS still remains a matter of doubt, and has called forth during the year a number of reports and reviews which leave the question about where it was. Each method has results which in themselves are striking, but the average results are not so much better than in the cases treated symptomatically that one can decide strongly in favor of any method. My personal experience is that the patient either gets well or dies, and I have not yet been so fortunate as to see a patient much influenced by any of the methods proposed.

The statistics of cases treated by the use of the antitoxin vary over a considerable range. Lund found a mortality of 39.5 per cent. in 167 cases treated with antitoxin; Haberling, in 43 cases, had a mortality of 44.2 per cent.; Schuchman,² in 76 cases, found a mortality of 47 per cent. According to Behring, the serum should be given not later than thirty hours after the onset of the symptoms, and at least 100 antitoxin units should be given. Schuchman found that in 16 cases in which these conditions were fulfilled all died. Ullrich³ adds four cases in which these conditions were fulfilled, but all died. The results from

¹ *Annales of Surgery*, xxxvii., 399.

² *Deutsche med. Wochenschrift*, 1903, 173.

³ *Mittheilungen aus d. Grenzgebieten der Medizin und Chirurgie*, 1902, 124.

the intraspinal and intracerebral injections are not particularly encouraging. Laubert collected 52 cases of tetanus treated by intracerebral injections of antitoxin, and the mortality is 63.46 per cent.; and of 24 acute cases treated in this way only 3 recovered—that is, a mortality of 87.5 per cent. It would certainly seem that the opinion expressed by Blumenthal, Jakob, and Leyden, that by the time the symptoms appear the tetanus toxins are already so firmly combined with the central nervous system that even dural injections cannot displace them, is correct. While it cannot be said that the use of the tetanus antitoxin as a curative measure has been attended by very brilliant results, there can be no question of its prophylactic value, and it should be used in 5 to 10 c.c. doses in all cases where tetanus can be reasonably feared, and neglect to use it in case of the blank-cartridge injuries is close to criminal.

The Baccelli method of treating tetanus by the use of *carbolic acid*, although introduced about a year before the antitoxin, was quickly overshadowed by the tetanus antitoxin, because of its analogy to the diphtheria antitoxin. It would seem from the report of seventy-five cases collected by Symmers¹ that this method is worthy of much more attention than it has heretofore received. It certainly has one very great advantage over the tetanus antitoxin, namely, its availability. Carbolic acid can be obtained anywhere and at any time, while the antitoxin can often be obtained only with great difficulty and after much time. The carbolic acid does not constitute a contraindication to the use of the serum or any of the nerve sedatives, but alcohol and the soluble sulphates should not be employed with the carbolic acid. The amount of acid which can be taken is very large, even 4 and 5 grams (60 to 80 grains) per day have been given subcutaneously, and in one case reported by Livingston 504 grains were given in six days.

Of these 75 collected cases 58 recovered, giving the astonishingly low mortality of 22.6 per cent. In 39 cases the period of inoculation was stated, and in 21 cases with an incubation period of less than ten days the mortality was less than 9.5 per cent., and in 18 cases with an incubation period of more than ten days the mortality was 11.11 per cent.

In contrast with this Moschowitz collected 290 cases treated by subcutaneous and intravenous injections of the antitetanic serum, with a mortality of 40.33 per cent. Thirty-one unclassified cases of tetanus treated by Jacob's method of subarachnoid injection of the serum gave a mortality of 32.35 per cent.

¹ American Medicine, 1903, 276.

Symmers, in closing his article, urges the most thorough cleansing of all suspicious wounds and all wounds which are known to be infected with the tetanus bacillus; that subcutaneous injections of antitetanic serum should be given in every case in which the development of tetanus is more than a remote possibility; that in cases of tetanus the patient should receive subcutaneous injections of carbolic acid along the tracks of the nerve trunks as soon as the diagnosis is made. The antitoxin should also be given by mouth or rectum, and in all cases pushed to the physiological limits. In all cases the patient should have also the antitetanic serum, preferably by Jacob's subarachnoid method—i. e., withdraw slowly 5 c.c. to 10 c.c. of cerebrospinal fluid by lumbar puncture, and then slowly inject 5 c.c. of the serum.

Tuberculosis has this year, as every year, been the subject of much discussion, and many hundreds of articles have appeared upon all phases of the question. Particular attention has been directed to the question of the unity or duality of the human and bovine tuberculosis, and it must be admitted that a review of the literature simply adds to any pre-existing confusion. The question of early diagnosis, particularly the early diagnosis of the pulmonary tuberculosis, has been repeatedly discussed, and an increased amount of attention has been paid to the agglutinating action of the serum of tuberculous patients and animals upon homogeneous cultures of tubercle bacilli without the question of the significance of such reaction being settled. The cytodagnosis of tuberculous exudates has been enthusiastically praised by some very high authorities. There has also been much discussion of the various old and new modifications of old plans of treatment.

One phase of the tuberculosis question which each year sees becoming more prominent is that of interest on the part of the laity and the lay press. There is scarcely a large city in the country which has not some society for the more or less public study of this question. A knowledge of the nature of the disease is becoming very widely disseminated among the general public, as is also a knowledge of the manner in which the disease is spread. The effects of this diffusion of knowledge is already being made manifest in the reduction in the mortality from tuberculosis and in the number of cases, and there is no reason to question that a few years more will see still greater effects. This propaganda is having also another effect in leading individuals and communities to establish sanatoria for the treatment of those who have not yet passed beyond the hopes of recovery. There is still great need for institutions of this sort, and also homes where those who are hopelessly ill may be sequestered.

THE COST OF TUBERCULOSIS. The dollar-and-cents aspect of this disease has been well brought out by Biggs, of New York, who has

published some interesting figures as to the cost of tuberculosis to the people of the United States. Putting the value of an adult life to the State at \$1500, the total value of the lives lost annually in New York city is \$15,000,000. This, however, is only a part of the loss, for to it must be added the loss of at least nine months of labor previous to death, together with the cost of care, food, nursing, medicine, and the like, making approximately \$8,000,000 more. This is for New York city alone, and when one considers that this same loss is going on all over the country one is appalled, not so much at the loss in money as at the loss of life and the attendant suffering. Dr. Biggs puts the financial loss to the country at \$330,000,000. While this is a sordid way of stating the matter, it puts it in terms which appeal to the average legislator, and should bring fruit in better legislation and the creation of proper public institutions.

TUBERCULOSIS AND PNEUMONIA. For some time the weekly Bulletin of the Chicago Health Department has been drawing attention to the greatly increased frequency of pneumonia. The death rate from this disease has gradually risen until it is now in excess of that of tuberculosis. This has raised the question of the relative importance to the community of these two diseases, and while admitting that pneumonia is now the cause of more deaths than is tuberculosis, the mortality from pneumonia is least during the most active and productive portion of life—the early adult life—and highest during childhood and advanced years. The opposite is true of tuberculosis, which reaps its richest harvest among the active, producing members of the community. Furthermore, pneumonia is a disease of short duration, causing death within a few days or ending in so complete recovery that in, at most, a few weeks the patient is again a normal member of society.

In contrast with this, illness from tuberculosis is preceded by a usually prolonged period of poor health and resultant loss of working capacity, followed by a long period of complete and expensive invalidism, ending usually in death.

If death does not occur and recovery takes place, the entire life and plans of the patient must be changed to fit the fact that the patient is tuberculous and can hope to keep the disease in check only by leading a life which has for its main object just that thing. With all these facts in mind there can be no dispute of the relative economical importance of these two diseases. When one considers that the death rate of tuberculosis is steadily and rapidly falling, and that when the diagnosis of tuberculosis is made early the chances of recovery are good; while, on the other hand, the mortality from pneumonia is as steadily increasing, and that in the presence of this disease the profession is practically

powerless, pneumonia appears worthy of the most serious attention, perhaps, even more worthy of attention than is tuberculosis itself.

ISOLATION OF TUBERCULOUS PATIENTS. Hillier,¹ in an article upon tuberculosis and the medical profession, draws attention to the falling rate of deaths from tuberculosis in England and Germany. This he attributes in part to improved sanitary and food conditions, and in part to the diffusion of the knowledge of the infectiousness of phthisis. In conversation with Koch, the latter dwelt particularly upon the dangers arising from the spraying of sputum by the patients when coughing or sneezing. All will now agree that this is a source of greater danger to the patient's friends than sputum which may dry and fly about, although the latter is dangerous enough. Koch also dwells upon the fact that patients who are hopelessly ill often return to their families in order to spend their last days among their friends. This is the period when they are the greatest sources of danger, and is just the period when their isolation should be most complete. It is as important, and in some ways more important, to provide comfortable homes for the hopeless cases than to provide institutions for the treatment of cases which still have a chance of recovery. The knowledge of the great danger attendant upon the last period of the pulmonary tuberculosis should be diffused.

It appears to me that this isolation of tuberculous patients during the last stages of the disease is of very great importance, and that while enforced sequestration of them would seem cruel, both to the patients and their friends, it is no more cruel than the sequestration of the smallpox patients, and is of far greater importance to the general public. Something, however, can be accomplished by a more general diffusion of the importance of direct inoculation by means of spraying sputum. This fact is by no means a new one, but is not as generally appreciated, even by the profession, as it should be.

HUMAN AND BOVINE TUBERCULOSIS. As already stated, there still continues to be much discussion of the relation existing between bovine and human tuberculosis, but it is now very generally agreed that Koch's statement that the human and bovine tuberculosis are separate and distinct is correct. In passing one might state that Koch was by no means the first to make this assertion, for Theobald Smith made the same statement previous to 1898, and showed two distinct races of bacilli provisionally designated as the bovine and human varieties. The second statement of Koch that the two diseases are not transmissible has been vigorously opposed by very many of our ablest men, and it may now be accepted as a well-established fact that the two diseases

¹ Practitioner, 1903, lxx., 788.

are transmissible, and that the bovine tuberculosis does occur in man, although less frequently than has been previously supposed.

In this country Ravenel and Solomon have shown conclusively that under certain conditions human tuberculosis can be transmitted to cattle.

Hamilton and Young, of Aberdeen, after extensive and careful experimentation, have concluded :

1. That although human tuberculosis is probably not so virulent for the calf as is that derived from bovines, yet it can be readily inoculated upon that animal.

2. This holds good whether the tuberculosis inoculated be derived from gland, lung, sputum, or urine.

3. The result is positive whether the tuberculous material is introduced by feeding, by subcutaneous injection, by respiring a spray containing the bacilli, or by infection into the venous system.

4. The organs most affected are those in immediate connection with the part operated on.

5. The lymphatic system is constantly involved in the resulting tuberculosis.

6. When administered by mouth tuberculous sputum induces an abdominal lymph-gland tuberculosis without the intestines being necessarily involved in any way.

7. When tuberculosis from a human source has been engrafted upon a calf, it gains enormously in virulence by being reinoculated upon another calf.

8. The morphological characters of the bacillus may vary according to circumstances, and are no guide to the source of the organism under observation.

9. The above facts go to favor the view that the human bacillus and that of the bovines are identical, but modified somewhat by environment.

Nathan Raw,¹ in a preliminary note upon human and bovine tuberculosis, based very largely upon a wide clinical experience, reaches the now very general conclusion that the two diseases are distinct, but that the human organism may be infected with either type of bacillus. He believes that the bovine tuberculosis entering the alimentary tract in milk may set up a *tabes mesenterica*, especially in children. He expresses the opinion that enlarged lymph glands, tuberculosis of the joints, and lupus, are instances of bovine tuberculosis. His experience has led him to conclude that true human tuberculosis is always conveyed from one person to another by infection, and that the commonest source of such infection is an advanced case of phthisis. While appreciating that the cattle are not so frequent a source of infection as formerly

¹ British Medical Journal, January 31, 1903.

supposed, he believes that every effort should be made to stamp out tuberculosis in cattle, and that milk should be boiled before given to children.

In the March 14th number of the same journal Raw reiterates his former conclusions as to the duality of the human and bovine tuberculosis and of the susceptibility of the human body to both forms of infection, and especially to bovine tuberculosis in the early period of life.

The two diseases are so rarely seen together in man that there seem to be some grounds for presuming that they are antagonistic to each other, and that bovine tuberculosis may possibly confer an immunity against human tuberculosis. "If this opinion should prove correct, I venture to submit that it would entirely reconcile the conflicting opinions which have been so frequently expressed during the last two years."

Raw is inclined to believe that the primary intestinal tuberculosis, the *tabes mesenterica*, and other tuberculous affections of the serous membranes in children are bovine tuberculosis conveyed by milk and not related to human tuberculosis, although the bacillus of Koch is found in them all, and is indistinguishable.

The two forms of bacilli cannot be distinguished under the microscope, but Ravenel affirms that "the tubercle bacillus from bovine sources has in culture fairly constant and persistent peculiarities of growth and morphology, by which it may tentatively be differentiated from that ordinarily found in man."

This idea of Raw's, that certain forms of human tuberculosis are due to the bovine bacillus and others are due to the human bacillus, appeals to me as a very reasonable one and one which could be quite easily settled if Ravenel and Smith are right in their assertions that the two forms of bacilli may be distinguished easily by culture.

Theobald Smith, in the last volume of the *Transactions of the Association of American Physicians*, draws attention to a simple method of distinguishing the bovine from the human type of bacilli in bouillon cultures. He found that, grown in acid bouillon, the bovine bacilli rather rapidly changed the reaction to alkaline, while the human bacilli, after a short initiatory reduction of the acidity, increased it markedly.

In this article, in which Smith reports a mass of experimental work and a careful review and criticism of the reports bearing upon the subject, we find the following conclusions:

1. The conception of a bovine and a human type of tubercle bacilli, introduced by me in 1898, is confirmed and still further defined. This conception does not exclude that of intermediate types likely to be found in other species.

2. Tubercle bacilli not distinguishable from the bovine type or race are occasionally encountered in the human subject.

3. From their action upon glycerin bouillon, mammalian tubercle bacilli may be divided into two groups : one corresponding to the human, the other to the bovine type.

4. Mammals other than cattle are probably infected either from cattle or from man, or from both sources.

5. The problem of the modification of biological and pathogenic characters of tubercle bacilli in foreign hosts is best approached by a comparative study of tubercle bacilli from different animals.

Orth,¹ in discussing the question of the relation of the human to the bovine tuberculosis, lays stress upon two important questions which must be kept constantly in mind :

1. Can the bovine tuberculosis be transferred to man ?

2. If it is possible, how great is the danger of this transference ?

It is manifest that if the first question can be answered negatively, the second question is thereby answered also ; but if the first question can be answered affirmatively the second must receive very careful consideration.

The only way in which the transference of bovine tuberculosis could be definitely settled would be by actual experimentation, evidently an impossible condition. We must, therefore, rely upon the clinical fact that sometimes butchers develop cutaneous tubercles just as the pathologist does. It must be admitted that this is a very infrequent happening when one considers the immense number of tuberculous cattle being slaughtered ; but, as Orth points out, the nature of the ordinary tuberculous manifestations in cattle is such that the bacilli are not free upon the surface as they so often are in human tuberculosis. When one recalls the great number of good chances for infection to which the pathologist is constantly exposed and the relative infrequency of such infection, one is not surprised that butchers are so rarely infected.

Since experiments from animals to man cannot be made, the reverse of the question can be considered, and one may infer that if the human tuberculosis can be given to cattle the reverse is true. There can now be no question of the possibility of transferring human tuberculosis to cattle and other animals. That has been settled by many experiments in the hands of many experimenters.

The first question which Orth raises must then be answered by yes. The second question, how great is the danger ? cannot yet be answered, for it requires more extensive and more careful investigation than it has yet received.

De Schweinitz² draws attention to some experiments reported by him in 1894, but which seem to have been disregarded of late, for

¹ Berliner klin. Wochenschrift, 1903, 657.

² Journal of the American Medical Association, 1903, 473.

otherwise there would be less tendency in some quarters to assume an absolute difference between tubercle bacilli obtained from man and cattle. Omitting all details, the experiments consisted in the repeated injection into cattle of a culture of attenuated tubercle bacilli obtained from a human, and later the inoculation of a virulent bovine bacillus without causing tuberculosis in cattle.

Pearson and Gilliland have also experimentally shown the relation of these two forms of bacilli. They took advantage of the fact that tubercle bacilli from human sputum are comparatively non-virulent for cattle, and used cultures from such bacilli for the inoculation of healthy cattle, and succeeded in affording a protection almost absolute from bovine bacilli, otherwise virulent for these animals.

PRODUCTION OF IMMUNITY IN TUBERCULOSIS. Trudeau, in reporting his experimental production of relative immunity against tuberculosis in rabbits and guinea-pigs, says that the work already done by himself and others would tend to establish the principle that in order to be successful the protective inoculation must be made with a living germ of such diminished virulence for the animal experimented upon as to produce a reaction ending in the victory of the living tissues over the bacilli and a complete aborting and healing of the process at first set up by them. Attempts to protect animals by the production of a purely toxic immunity along the lines so successful in diphtheria, by the use of such bodies as the Koch tuberculin or the tuberculin R. have been failures. On the other hand, success in protecting animals to a greater or less degree has rather generally resulted when attenuated cultures of living bacilli have been used. Such attenuated cultures may be obtained in two ways: either by selecting a variety of the tubercle bacillus, whether bovine, avian or human, naturally of little virulence for the race to which the animal to be protected belongs, or by previous inoculation with a variety naturally virulent for the kind of animal selected for protection, but attenuated by prolonged cultivation.

It seems reasonable to hope, now that this principle of immunization seems to have been fairly well established, that improved methods of protection will reduce to a minimum the dangers of the protective treatment, and produce, it may be, a more durable immunity.

TRANSMISSION OF BOVINE TUBERCULOSIS. Bearing upon the question of the transmissibility of bovine tuberculosis to the human, Kober,¹ in an article in which he has carefully collected the cases of transmission of bovine tuberculosis by milk, finds that they now number eighty-six, a much smaller number than generally supposed. This is so much smaller than the authentic instances of typhoid epidemics due to impure

¹ Transactions of the Association of American Physicians, 1903, xcvi.

milk that one is surprised at the amount of attention given to milk-borne tuberculosis as compared with that given to milk-borne typhoid. Kober,¹ in 1900, tabulated 195 *typhoid epidemics* due to milk, and the last three years would materially increase this number, and yet there are only eighty-six cases of milk-borne tuberculosis. Kober's article includes a very complete review of the literature and the recorded cases, and anyone wishing for detailed information cannot do better than turn to this article. It is sufficient for our purposes to quote the conclusions to which he comes. They are as follows :

1. Tuberculosis may be transmitted to man in milk from tuberculous cows ; the danger from this source is real, and cannot be measured by the actual number of recorded cases, but should be judged in part, at least, by inoculation and feeding experiments and the accidental wound infections which have established the intercommunicability of bovine and human tuberculosis.

2. The degree of danger may also be estimated by the prevalence of bovine tuberculosis and the forms other than *phthisis pulmonalis* in man, remembering that the infectious qualities of milk are greatest when the udder is the seat of lesions, and that Gebhardt's experiments have shown that tuberculous milk when diluted with the milk of sound animals in the proportion of 1 : 40 loses its infective power.

3. The experimental studies also indicate that while the bacilli of human tuberculosis possess different degrees of pathogenic power, and are often of feeble virulence for cattle, Koch's assumption that human and bovine tuberculosis are distinct, and that human tuberculosis cannot be conveyed to cattle, appears disproved, and his failure to secure similar results may be attributed to the use of human bacilli of diminished virulence.

4. Recent investigations have strengthened Smith's claim that there are two types of tubercle bacilli: the so-called bovine and human types, possessing certain morphological and biological differences, but it has also been shown that virulent cultures may be obtained from both of these types, which, when inoculated into animals, produce the disease in question.

5. Further research seems desirable, with a view of determining the frequency of primary intestinal and abdominal tuberculosis in all cases which come to autopsy, whether the child perished from tuberculosis or not, and in these autopsies the bacteriological examination should be directed to the existence of the two types of tubercle bacilli originally referred to by Smith, and whether the bovine type predominates in the so-called scrofulous lesions.

¹ Transactions of the Association of American Physicians, 1903, ix.

6. Careful chemical analysis of the milk of tuberculous animals should be made, with a view of determining the amount of phosphoric acid as compared with quantity in normal milk, since it appears probable from de Schweinitz's biochemical researches that the excess noted by older chemists is really the result of bacterial activity in the udder of the cow.

In the meantime the pathologist has no occasion to reverse his opinion as to the identity of human and bovine tuberculosis, and the sanitarian has no reason to assume that the human subject is immune against infection with the bovine bacilli, or is so slightly susceptible as to cause him to relax his efforts in preventive measures.

Another article having some bearing upon this subject, and at the same time illustrating the difficulties which surround the solution of this and similar questions, is that by Macfadyen and Macconkey.¹ They report some experiments undertaken with a view of determining the presence or absence of virulent tubercle bacilli in the mesenteric glands of young children. The glands were mechanically disintegrated until they could be injected with an ordinary hypodermic syringe. Of each gland used one-half was injected subcutaneously, and the other half peritoneally into a guinea-pig. At the end of six to eight weeks any animal which had survived was killed. The result was considered positive only when the tubercle bacilli could be demonstrated in the lesions in the animals.

Glands were taken from twenty eight children, eight of whom were tuberculous, and the inoculation experiments were positive in 10 cases, 5 from the tuberculous children, and 5—i. e., 25 per cent.—of the 20 children apparently free from tuberculosis had virulent tubercle bacilli in their mesentery glands.

One stillborn child deserves special mention, for tubercle bacilli were obtained from its mesenteric glands. Similar experiments were made with forty-four cases of *adenoids*, and thirty-four cases of *tonsils* removed by operation, but in no instance did the tissue show tuberculous lesions, and in no instance did the experiments on the guinea-pig show the tubercle bacilli.

AGGLUTINATING REACTION IN TUBERCULOSIS. The reports upon the agglutinating action of serum upon homogeneous cultures of tubercle bacilli have varied so, ranging from the most enthusiastic to the absolutely condemnatory, that one must wait for further work before one can have a definite opinion upon the value of this reaction as an aid to diagnosis. There are many things to recommend it; the ease of its application and its freedom from danger to the patient; but these good

¹ British Medical Journal, 1903, 129.

qualities are nothing if it is found that the reaction is frequently absent in tuberculous patients, or frequently present in those who are not tuberculous. The general impression which one gets from reading the rather numerous and lengthy articles which have appeared is that Arloing and Courmont and their compatriots have been carried away by an enthusiasm which, while admirable, has led them into error.

A. E. Wright,¹ in an interesting note upon the intimate nature of agglutination reaction, says that a negative result of a serum reaction may indicate (a) the absence of the particular bacterial invasion which is suspected; (b) the purely localized nature of the invasion; and (c) the absence of the power of immunizing response upon the part of the invaded organism. Looking at the tuberculous serum reaction from this standpoint, and keeping in mind the fact that the tuberculous infection is usually localized, we have little reason to expect to derive much assistance in the diagnosis of tuberculosis from the serum sedimentation reaction. On the other hand, however, this reaction forms a useful guide in estimating the response of the organism in cases being treated by tuberculin injections, increasing with the antibacterial substances produced by the organism under the influence of the injections.

The number of articles based upon a study of many cases would tend to support this conclusion drawn from theoretical considerations. For instance, Loeb,² after a consideration of the various methods, particularly the tuberculin injections, employed in efforts at the early diagnosis of tuberculosis, reports his studies of the agglutinating reaction of Arloing and Courmont, claimed to be as satisfactory as any of the methods formerly proposed, and having the great advantage of being harmless. A careful description of the technique is given, and anyone interested in this phase of the question is referred to the article. For our purpose it is sufficient to quote his conclusions, which are as follows:

1. Under various conditions animal sera agglutinate homogeneous cultures of human tubercle bacilli in liquid media.
2. Such sera may be obtained from the human or animal body without the presence in it of the bacillus tuberculosis.
3. It is doubtful whether the agglutinative powers are ever due to the specific action of the bacillus tuberculosis.
4. The presence or absence in the adult blood serum of agglutinative properties for tubercle bacilli is no decisive evidence of the presence or absence of tuberculous lesions in the body.

Although resting with this single quotation, it may be stated in a general way that most of the articles, other than those in French,

¹ British Medical Journal, 1903.

² Journal of the American Medical Association, May 23, 1903.

reach about the same conclusion, although there are some who make favorable reports.

CYTODIAGNOSIS IN TUBERCULOSIS. Another method of diagnosis of tuberculosis, appreciable, however, to only a limited number of cases, is that of cytodagnosis to determine the nature of exudates into the various serous cavities. In this connection mention may be made of a lecture by Dieulafoy in his last volume of clinical lectures, in which he reviews in his inimitable way the various methods employed in determining the nature of a case of pleurisy suspected to be tuberculous. The subject is very carefully handled, and the lecture is mentioned here particularly because of the enthusiasm with which Dieulafoy describes the results of the examination of the exudate for cells.

The same enthusiasm is shown by others, among them Ketly and Torday, whose article is quoted.

Ketly and Torday,¹ after passing in review the various methods employed in efforts to determine the nature of exudates in serous cavities, particularly the pleural cavity, report their studies of the Widal-Ravot cytodagnostic method. This method is founded upon the fact that different kinds of cells react to different causal agents. They found that acute exudates of tuberculous origin, whether primary or secondary to a tuberculosis of the lung, contained many lymphocytes, while exudates due to the action of other microbes contained polymorphonuclear neutrophile cells. The pleural fluid seen in heart and kidney cases contained many endothelial cells. Exudates of mechanical origin contained endothelial cells, and later lymphocytes also.

These observations are explained in this way: With tuberculous inflammations of the serous membranes the membrane is covered by a thinner or thicker false membrane which prevents the exfoliation of the endothelial cells, and the prolonged irritation causes an abundant escape of the lymphocytes from the very numerous lymph vessels of the pleura. Other toxic or infectious irritants exert a positive chemotactic influence upon the leukocytes, hence the large number of cells of this sort in the exudate. In mechanical processes, such as are seen in the heart cases, there is a considerable maceration and exfoliation of the endothelial cells.

In cases of chronic inflammation the cytodagnosis has not proven reliable. The method employed is as follows: About 15 c.c. of the fluid is defibrinated. This is done by adding some small glass balls to the fluid and shaking them up together in a test-tube until fibrin ceases to be deposited; the supernatant fluid is then poured off. Such

¹ Deutsche Archiv f. klin. Medizin, 1903, lxxviii., 168.

fluid as is left with the fibrin is then spread upon slides, fixed by heat or an alcohol-ether mixture, and stained with Ehrlich, Biondi, acid hæmatoxylin, or thionin.

Ketly and Torday examined forty-two cases. In six cases of primary pleurisy proven to be tuberculous by the later development of a pulmonary tuberculosis or by animal inoculation, and in eight secondary tuberculous pleurisies, the cytological examination showed the lymphocytes. Chronic tuberculous pleurisies can hardly be distinguished by this method from those developing in heart and kidney cases.

The fluid accumulation in the pleura in heart and kidney cases show many endothelial cells, and later many lymphocytes.

Pneumococcus pleurisies show many leukocytes and endothelial cells. Marked lymphocytosis in the fluid in an acute case demonstrates the tuberculous nature of the process, but lymphocytes may appear in other forms of pleural exudates in the later stages of the disease.

DIAZO REACTION IN TUBERCULOSIS. The diagnostic value of the Ehrlich diazo reaction is not great in any one disease except the negative value which it has in a case thought to be typhoid; but some work by Francis Carter Wood¹ draws attention to the prognostic significance of this reaction in tuberculosis. Wood studied some 363 cases of pulmonary tuberculosis, of which 117 ended in death. Some 90 per cent. of the fatal cases showed a positive diazo reaction during the last few months of life, and from the observation the author draws the following conclusions:

1. If the urine of a tuberculous patient shows no diazo reaction, and a lesion of the kidneys can be excluded, the prognosis is favorable.
2. If the urine shows an occasional reaction the prognosis is not necessarily grave, as but 66 per cent. of the patients showing the reaction died.
3. A continuous strong diazo reaction gives a very grave prognosis, as a large proportion of these cases died within six months.

SPECIAL FEATURES OF TUBERCULOSIS. During the year certain special features of this disease have received special attention. Mention is made of two of these in hope that the observations may be multiplied. The first of these is the *tuberculous pseudorheumatism*, to which reference has already been made in a previous volume of *PROGRESSIVE MEDICINE*. The other, the occurrence of cutaneous tubercles in miliary tuberculosis, is of great interest.

Bezancon² draws attention to the rapidly multiplying examples of the so-called tuberculous pseudorheumatism. There is now no doubt of

¹ Medical News, April 4, 1903.

² Bull. et mémoires de la Soc. médicales d. hôpitaux de Paris, 1903, 651.

the occurrence of these cases, but great caution should be exercised in the diagnosis of them. The two diseases, tuberculosis and rheumatism, are both so common that their coincident development in the same patient is readily conceivable, and it is not far to suggest that each disease creates to a certain degree a predisposition, or at least a lessened resistance to the other. The articles of Poncet, Patel, and Trebeneau were referred to in an earlier volume of *PROGRESSIVE MEDICINE*, and since then a number of other articles have appeared and furnish the basis of the article in which Bezancon describes the clinical picture of tuberculous pseudorheumatism.

The cases may present themselves under the ordinary clinical picture of an acute articular rheumatism, and the nature of the process is questioned only when the case follows an abnormal course. There may be no response to the salicylates, the changes in all the joints except one or two, or the joints may ankylose. Or the case may end as a rheumatism would end, and no question of the nature of the joint changes arise until later the patient develops a multiple serositis, a pulmonary tuberculosis. Other cases show at the time the joints are involved an inflammation of one or more of the serous membranes, or some manifestly tuberculous lesion in some part of the body.

All of these things, however, are merely suggestive, and a diagnosis of a tuberculous pseudorheumatism must be made from an examination of the joint fluids. Of the various methods employed only one is conclusive, namely, the demonstration in the joint fluid, by smear, culture or inoculation of the tubercle bacillus. The demonstration by inoculation has been successful in several cases, and only such cases can be accepted as conclusive. The value of the cytodiagnosis as applied to the joint fluid is yet somewhat questionable, as, indeed, it is in regard to the pleural, peritoneal, or other serous membranes. The agglutinating reaction of the blood serum to the tubercle bacillus, as described by Arloing and Courmont, is of questionable value, just as the tuberculin test is, because of the possibility of there being some hidden focus of tuberculosis.

Griffon, in the same number of the same journal, reports a case observed in the clinic of Dieulafoy. The case was that of a young man who presented a polyarthritis, which was at first thought to be an ordinary rheumatism. The idea of some form of pseudorheumatism was suggested because, while the constitutional symptoms and the changes in most of the joints disappeared, the knee-joint and ankle-joint became worse. A gonorrhoeal arthritis was excluded, because the patient had not and never had had a gonorrhoea. The knee-joint was aspirated. The fluid was very fibrinous, and the cellular elements were found to be almost entirely lymphocytes and not leukocytes, such as

are found in gonorrhœal joints. Inoculation of the joint fluid caused tuberculosis in two guinea-pigs. The patient made a complete recovery without any permanent changes in the joints, and had remained well up to date. Whether or not he will develop some other form of tuberculosis elsewhere or not at some later date, as a number of similar cases have done, time alone can settle.

Whether or not the joint changes in all joints in this and other similar cases are the results of the direct action of the tubercle bacillus, or of the indirect results of the tuberculous toxins cannot at the time be stated.

In the *Jahrbuch für Kinderheilkunde*, vol. lvii. p. 671, is a short note upon a demonstration of gross and microscopic specimens showing *tubercles in the skin* from two patients dying of *miliary tuberculosis*. There were isolated, universally distributed, hard red nodules, ranging in size up to that of a hempseed. They were sharply differentiated from the surrounding normal skin, and not only developed under observation but also disappeared again. They did not ulcerate. Microscopically they showed the ordinary structure of a tubercle, and the bacilli could be demonstrated.

Such miliary tubercles in the skin would seem to be rare, for there is no mention of them in any of the works upon this subject, and the only analogous publication in the literature is a report by Leichtenstern. It would seem, however, that this is possibly another instance of how things may be overlooked until someone notes them, and then it is found that the condition is not rare. At any rate, Reusburg-Solingen, who showed the above-mentioned specimens, demonstrates at the same time a tuberculous patient who showed in his skin nodules exactly similar to those taken from the skin of the two fatal cases.

THE TREATMENT OF TUBERCULOSIS has shown no particular change with the passage of the year. Confidence in the use of the very numerous drugs advocated has decreased rather than otherwise, while the opposite is true of the dietetic-hygienic treatment. This last, in appropriate cases when carefully carried out, is yielding more and more encouraging results, and one can but agree with Petruschky in his statement that "the combination of the physical dietetic treatment alternating with the tuberculin treatment is at the present time the most satisfactory treatment for those cases of pulmonary tuberculosis which are not too far advanced. The proper use of tuberculin for diagnostic and therapeutic purposes has been so worked out by years of experience of a few painstaking men that it is now possible for a well-informed physician to avoid all mishaps in its use."

Pottenger¹ publishes a careful critical study of tuberculin and allied

¹ Therapeutic Gazette, 1903, 163.

products, based upon the literature and upon replies to a circular letter sent to many men in this and other countries. The replies cover a wide range of opinion, but practically, without exception, the more actual experience the men had had with the tuberculin the more favorable the opinion they expressed. Marked opposition to its use was met only in men who had had unfortunate experiences some years ago or were still influenced by such experiences in the hands of others. All who expressed an opinion of its diagnostic use favored it, and that the tuberculin may be safely used for this purpose is shown by the collected report of Anders, covering 3638 cases without ill effects.

Pottenger collected reports of 589 cases of tuberculosis treated during the first stage of the disease, with 496, or 84.2 per cent., apparent cures. He also collected 611 cases treated during the first stage in sanatoria, with 391, or 64 per cent., apparent cures. This difference of 20 per cent. may be reasonably referred to the tuberculin, for it is the only constant factor in the 589 cases.

Trudeau reports the later course of some fifty cases treated with and without tuberculin, and finds that the percentage of permanent cures is higher with tuberculin, 69 per cent., as compared with 52 per cent.

The most important thing is to make the diagnosis early, and when this is done the combination of good food and plenty of good free air with the tuberculin will give results which are very satisfactory.

Typhoid Fever, which is always of interest, has had added interest, because of the separation from it of cases due to the paratyphoid bacillus. Clinicians have for a long time realized that a certain percentage of cases of typhoid fever differs enough from the perfect type to warrant their separation into a sub-group. These cases have until recently been accounted for by the very unsatisfactory explanation of a difference of the interaction of the typhoid bacilli and the human organism, and by the well-known variation in the manifestations of typical diseases from year to year. With the introduction of the method of blood cultures we have been able to separate the cases of true typhoid from the cases of paratyphoid infection. Much of the most important work of the year has been done along this line. Another subject which has been assiduously studied is that of the bacillæmia of typhoid; particularly has attention been paid to the time of its development and its duration. Still a third aspect which received attention, and with results which seem worth while, is that of the development of a specific treatment. Two forms of serum have been used, one by Chantemesse and one by Mendez. These and other questions will be taken up at some length; but before doing so it would seem best to briefly consider some new and old facts concerning typhoid fever as an epidemic disease, and the means by which this disease is spread.

THE MEANS BY WHICH TYPHOID FEVER IS SPREAD. The spread of typhoid fever by means of oysters is a subject which has for some years excited attention, particularly in England, where it still is a subject of study. Thresh and Wood¹ report an outbreak of typhoid fever in Essex, England, and believe oysters to be the means of diffusion of the bacilli. Oysters taken from the implicated beds showed a variety of bacilli, and, while no typhoid bacilli were discovered, the bacillus coli communis was repeatedly demonstrated. Experiments were made to determine whether the oyster would take up the typhoid bacillus, and, if so, how long they would be retained. Oysters were placed in sea-water to which a bouillon culture of typhoid bacilli had been added, and upon the second day were removed and placed in pure fresh sea-water. The gastric fluids of these oysters were examined at intervals, and up to the seventh day the typhoid bacillus could be recovered and identified. These experiments show that the oyster can harbor and carry the typhoid bacillus, and that care should be taken to avoid freshening oysters in water which is infected with the typhoid or the colon bacillus.

This subject has acquired a more direct interest because of a report from Dr. Marvel, of Atlantic City, where a number of cases of typhoid fever developed, but could not be traced to any of the ordinary sources of infection. Investigation showed that some of the oysters for local consumption were being freshened in a canal only a short distance below the entrance of a sewer. It was known that cases of typhoid fever had been in the city previously, and it was believed that the later cases were due to oysters infected in the canal. At any rate, no further cases developed after the sale of oysters and clams subjected to the freshening or fattening process was prohibited under legal penalty.

Reference has already been made in PROGRESSIVE MEDICINE, December, 1903, p. 351, to the work of Alice Hamilton and of Licker, showing the importance of the common house-fly in the dissemination of the typhoid bacillus.

In this connection an address by Robert Koch before the Senate of the Kaiser Wilhelm Academy is of interest. Koch, being convinced of the extreme importance of the disinfection of the excreta, states that in the prevention of typhoid fever special caution with regard to the drinking-water may be dispensed with, providing certain other precautions are enforced. He urges as the surest method of prevention the complete isolation of every single case and the disinfection of the clothes and excreta. Inasmuch as no other source of typhoid infection exists except the diseased man, he holds that by this method

¹ Lancet, December 6, 1902.

alone the disease can be stamped out in foci, where it originated, just as cholera and malaria can be.

The great practical difficulty in the way of this method is that most cases exist for a number of days before the disease is recognized as typhoid, and many, probably more cases than we realize, never seek the doctor at all. Koch recognizes that the Widal reaction is not sufficient for an early diagnosis, and recommends the methods of Drigalski and Conradi, that is, using a culture media slightly stained with litmus and inoculating it with the feces. The acid-forming colonies of the colon bacillus are readily distinguished in this media from the alkaline colonies of the typhoid bacillus. Koch has been able in this way to make a positive diagnosis within twenty-four hours, and as early as the second day of the disease.

Koch made a practical application of this method of stamping out typhoid fever in the village of Trier, and found, as might be expected, that the greatest obstacle lay in the fact that only a small proportion of the cases were recognized as typhoid. Thus, for example, in families where eight cases were reported as having typhoid, Koch found seventy-two with typhoid bacilli in the stools. By use of these methods the epidemic of typhoid was stamped out in this village within three months, although it still continued in neighboring and similarly located villages. One other point which Koch does not touch is the duration of the presence of typhoid bacilli in the stools after convalescence. This appears to be an important matter, and one upon which I have no data.

The importance of the feces in the diffusion of typhoid has been long known, although complete use of that knowledge has not been made. It is only recently, however, that it has been realized that the typhoid bacilli alive and active are excreted through the kidney. This fact, which is of great importance both to the patient and the general public, has been studied by Richardson,¹ who found the typhoid bacilli in the urine of 21 per cent. of the cases examined. The *bacilluria* does not usually appear until the latter part of the course of the typhoid fever. The typhoid bacilli are usually in pure cultures, and often in enormous numbers. They may persist for a few days only, but in many cases, unless effort is made to destroy them, they may persist for weeks and months, maybe, even for years. Not only are they a source of danger to the patient, being liable to excite cystitis, orchitis, epididymitis, etc., but they threaten the public health, and no typhoid patient should be dismissed and the disinfection of the urine cease until the urine has been proven to be permanently free from

¹ Boston Medical and Surgical Journal, February 5, 1903.

bacilli. Fortunately we have in urotropin a safe and efficient means of destroying the bacilli.

Dufloeq and Voisin¹ report an interesting and very unusual method of acquiring typhoid fever. This patient, a girl aged nineteen years, swallowed a virulent culture of typhoid bacilli with the intention of committing suicide. This constitutes an actual laboratory experiment, and is a rare if not unique opportunity of showing the specificity of the typhoid bacillus and of the possible duration of the incubation period. The culture was taken on March 20th, and for two days nothing happened. On the third day she began to complain of feeling badly, and had a headache. The next day she had a slight temperature. The next two days the headache, malaise, and temperature continued, and on the seventh day she had some abdominal pain. On the eighth day she was still worse, and showed a few rose spots and nose-bleed. On the ninth day there was marked depression, headache, tongue dry and coated, rose spots, some pain in the right iliac fossa. The spleen was somewhat enlarged, and the Widal reaction 1 to 15 was positive, although it was negative at 1 to 50. The case ran an ordinary typical course, and ended in recovery.

This very interesting observation throws some light upon points which have been obscure, particularly upon the duration of the incubation period. Because of the impossibility of telling when the bacilli enter the gastrointestinal tract, nothing definite has been known of the incubation period. This experience, though but a single one, would lead one to a supposition of an incubation period of but three days. The rose spots appeared rather earlier than is generally stated, showing themselves upon the fifth day of illness, instead of the seventh to tenth day as generally stated. The Widal also appeared earlier than is generally expected, being demonstrated upon the sixth day of the illness.

BLOOD CULTURES IN TYPHOID FEVER. The blood of typhoid fever patients has been energetically studied by a large number of investigators, particularly with reference to the *bacillæmia*, and all agree that we have in the blood culture a practical and valuable aid to the diagnosis of typhoid—one which is certain and available early in the course of the disease. The quickness with which this method has been accepted and the general use to which it has been put is shown in an article by Rosenberger.² He collected from various sources 535 cases of typhoid in which the blood has been examined for typhoid bacilli, and they had been found in 80 per cent. of the cases. So large a percentage of successes as this strongly suggests that the typhoid bacilli

¹ Archiv. générale d. médecine, 1903, 2197.

² Proceedings of the Philadelphia Pathological Society, 1903.

are present in the blood in all cases, and this suggestion is strengthened by the fact that in many instances the first attempt to find them failed, while later efforts succeeded.

Courmont and Lesieur¹ report a series of thirty-seven cases of typhoid fever studied in this manner for the particular purpose of determining the value of this method as an aid to early diagnosis. 2 to 4 c.c. of blood were obtained by venous puncture and added to 300 to 500 c.c. of bouillon. The earliest at which the bacilli were found was the fifth day, and the latest the twenty-third day. In four of nine cases the bacilli were found in the blood before the Widal reaction appeared. The bacilli were found in thirty-three of the thirty-seven cases. The time required for the development of the culture varied, but in 60 per cent. of the cases the cultures grew in twenty-four to forty-eight hours. In some cases the cultures are so slow in growing that they seem sterile, growing only after several days. In three instances the growth was delayed for over five days. A comparison of this retardation of growth with the agglutinating power of the serum showed that there was no relation between the two. There was also no relation between the prognosis and the retardation.

Sacquepée and Perzuis² had much the same experience with a series of thirty-four cases. They found the typhoid bacilli in thirty-two cases. The two failures were in patients entering the hospital upon the twentieth and twenty-second days. They, too, found that the cultures may be positive before the serum reaction appears. The cultures usually required from twenty-four to thirty-six hours to develop. Widal found the bacilli in seventeen of twenty moderate and severe cases, but failed to find them in five mild cases.

Ruedinger³ reports upon a bacteriological study of the blood of thirty cases which clinically appeared as typhoid fever. Two of them proved to be paratyphoid infection, and one remained of doubtful nature. In twenty of the cases the bacilli were found in the first culture nineteen times, and in each of these cases the temperature was still rising. In one case the culture was negative the first time, but one made seven days later was positive. In another case the cultures were positive twice, once early in the disease, and again twelve days later.

The value of this work upon the bacteriology of the blood in typhoid fever cannot be exaggerated. It not only influences our general conception of the disease, but aids us in the diagnosis, particularly in the differentiation of the paratyphoid infections from the true typhoid,

¹ *Journal d. Physiologie et d. Pathologie générale*, 1903.

² *Bull. et mém. Soc. d. hôp.*, 1903, 639.

³ *Medicine*, 1903, 258.

and throws a strong light upon the value of certain methods of treatment. It may be contended that the method is not one appreciable to general practice, and this will prove true for the present in the less thickly populated portions of the country. But in places where there is enough medical work to support a medical laboratory, the bacteriological examination of the blood is feasible and of such value that it cannot be omitted in cases about which there is dispute. The demonstration of the bacilli in the blood takes typhoid fever out of the group of infectious diseases with local manifestations and places it with the general infections. It explains why the intestinal antiseptic treatment of typhoid, long known to be of doubtful value, is of so little value. Probably all will agree that the most important result of all this work is the separation of the paratyphoid infections.

Hayashikawa¹ reviews the whole matter of the bacteriological diagnosis of typhoid, including the Gruber-Widal reaction. Like all who have interested themselves in this matter, he believes the bacteriological diagnosis to be of the greatest importance, and in certain cases the only way in which a diagnosis can be made. Valuable as the Gruber-Widal reaction is, one cannot from it alone make a positive diagnosis, for the reaction may be retained for a long time after convalescence from typhoid. It is only when we see the reaction increase in intensity from day to day that a positive diagnosis can be based on it alone. Bacteriological examination of the stools is positive in about 60 per cent. of the cases, and would be a valuable aid to diagnosis were it not so difficult to carry out. In this connection reference should be made to the fact that Koch claims to be able to make the diagnosis from the stools easily and within a short time, and, what is, perhaps, most important, early in the disease. Cultures were obtained from the urine in 18 per cent. of the cases, rather lower than the percentage stated by other observers. The typhoid bacilli were obtained from the roseola in 58 per cent. of the examinations made. In view of the large percentage of positive results from the examination of the blood one must wonder why the percentage of successes is so low.

Hayashikawa found the bacilli by *splenic puncture* in seventeen of eighteen cases, and has seen no ill results in twenty-seven cases. This method of examination has been repeatedly advocated, but the very general impression has been that the knowledge gained was not worth the risks run. This method seems to have become very popular in Prague, and Adler,² the clinical assistant of von Jaksch, publishes a very enthusiastic report upon splenic puncture as a means of early diagnosis in typhoid fever. He regards the splenic puncture as free

¹ Zeitschrift f. Heilkunde, 1903, 24.

² Deutsche Archiv f. klin. Medicin, lxxv., 549.

from danger, and it seems to have been so in his hands. It must not, however, be forgotten that other observers have not been so fortunate, and it appears to me that this method ought not to be employed unless it has very great advantages over other current methods, and such advantages it does not seem to have. Adler has made the splenic puncture in something near three hundred cases, over half of them typhoid fever patients, and was generally able to make a positive diagnosis in ten to twenty hours. He has never seen any ill results follow the puncture, and advocates the following method: The splenic dulness, particularly its upper border, is carefully determined by percussion and outlined on the body with the dermatographic pencil. The lower border is determined by palpation. A point one inch below the upper border and in the midaxillary line is indicated. This is generally in the eighth or ninth interspace. This area is carefully prepared and, after instructing the patient to breathe quietly and to hold the breath during the puncture, the needle is thrust inward horizontally for 4 to 5 cm. From one to ten drops of blood are withdrawn, and bouillon cultures are inoculated and incubated in the usual manner.

J. S. Billings, Jr.,¹ reports some work in the New York Board of Health Laboratory, in which comparison is made between the *diazo* and the *Widal reaction*. Both reactions were present in 43 cases. In most instances both specimens were received the same day, but in 7 cases the Widal was not present until three or more days after the diazo appeared. In 23 cases the diazo was positive and the Widal doubtful; 19 of these proved to be clinically typhoid fever, and 4 remained doubtful. In 25 cases the diazo was positive and the Widal negative; 19 of these proved to be clinically typhoid fever. In 5 instances the diazo was negative and the Widal positive. Billings' conclusions correspond with those already current. The diazo is of value in the diagnosis of typhoid fever, but mainly in a negative way. Its continued absence makes it about 50 to 1 against the diagnosis of typhoid. It is much more constant than the Widal, but its presence is not highly significant, for it appears in a wide variety of conditions, and particularly does it appear in the infections most likely to be confused with typhoid.

TYPHOID FEVER IN CHILDREN. The always interesting subject of typhoid fever in children is well handled in a report of ninety cases by Abt.² The children ranged in age from eight months to fourteen years. The eight-months-old child ran a very typical course, with roseola, enlarged spleen, continuous temperature, and Widal. Another child, aged twenty-one months, died, and showed at the autopsy the

¹ New York Medical Journal, April 18, 1903.

² Medical News, 1902, 818.

lesions found in any ordinary typhoid. The children old enough to give an account of their symptoms reported the same initiatory symptoms as those given by adult cases, but the onset was somewhat more abrupt. In nineteen cases the onset was with vomiting, a rather unusual initial symptom of typhoid, but the typhoid in adults at the time when Abt was seeing these cases in children were peculiar in the frequency with which they began with vomiting. Convulsions initiated the clinical picture but once. Headache was the most common symptom, being reported in forty-two cases. Epistaxis occurred four times. In younger children the pulse was rather rapid, but in the older children one found the relative bradycardia so characteristic of the typhoid fever in adults. Excluding the cases of perforation and of collapse due to other causes the pulse never rose above 150. The course of the fever was in no way peculiar, following the typical curve. Hemorrhage occurred in five cases. The Widal was present in all but two cases. Typhoid bacilli were found in the urine in a few cases.

Churchill makes a careful report of a clinical study of the blood in forty-seven cases of typhoid in children ranging in age from twenty-two months to twelve years. He finds that the percentage of hæmoglobin falls rapidly during the second week, more gradually during the third and fourth, and in the fifth week it begins to recover. The average percentages during the first five weeks are, in order, 97, 80, 73, 66 and 75 per cent. The effect upon the number of red blood corpuscles is but slight, the number in uncomplicated cases rarely falling as low as 4,000,000. The chief interest in the blood of typhoid centres in the white corpuscles. During the first four and a half weeks the number of white cells is reduced. Churchill's lowest average is 6467 during the second week. The leucopænia is less marked than in the adult, and is of shorter duration. The lowest count was 2000 in the third week. In general, the more severe the clinical picture the lower the leukocyte count. When one recalls the ease and frequency with which a leukocytosis is produced in childhood, a leucopænia in a child suffering with an obscure fever is almost diagnostic of typhoid, and while the leucopænia is not as conclusive as the Widal reaction, it certainly ranks second to it. Churchill was unable, because of the conditions surrounding the work, to determine whether the leucopænia antedates the Widal or not. The differential count of the white corpuscles shows a marked fall in the number of the polymorphonuclear cells and an equally marked rise of the mononuclear forms beginning during the second week. The rise in the mononuclears is only a relative increase, not absolute. Complications of a variety of kinds caused a polymorphonuclear leukocytosis, often quite high.

COMPLICATIONS OF TYPHOID FEVER. Among the unusual complications of typhoid there is none more uncommon than inflammations of the serous membranes, except the peritonitis following perforation. This is a rather striking fact when one compares it with the frequency with which serous inflammations occur in the course of other diseases in which a bacteraemia is a constant part, and still more striking when one recalls the frequency with which inflammations of other tissues, such as the bones for example, complicate this disease. One, therefore, reads with interest the report by Gaudy and Gourand¹ of a case of *pericarditis* complicating a mild typhoid. The case which occurred in the service of Dieulafoy was that of a young woman who entered the hospital upon the eighth day of a mild typhoid fever. The examination made at entrance showed, in addition to the finds usual in a typhoid at this stage of the disease, a dry pericarditis. The course of the fever was mild, without very high temperature and without any signs of a typhoid state. The fever was of average duration, but upon the twenty-fourth day of the disease, without any warning, the patient died with great suddenness. Gaudy and Gourand offer no explanation of this sudden death, and it is useless to speculate as to what the cause might be. The authors were able to collect from the literature only thirty instances of this complication. The commonest form is the ordinary fibrinous type, and, so far as one can judge from the descriptions of the cases, shows the same variation and degrees presented by fibrinous pericarditis due to any of its ordinary causes.

As already stated, peritonitis due to intestinal perforation is common, but *peritonitis without perforation* is a less common event in the course of typhoid fever. Yates,² in a report covering two cases of peritonitis without perforation, speaks of this as a complication which is by no means rare, and states that it occurred seventy-three times in 4300 cases, which is 1.7 per cent., about one-third as frequent as peritonitis from perforation. This is so greatly different from personal experience that I am forced to think that there is some confusion of terms or some other adequate explanation for the great difference in experience. I have seen some dozens of cases of perforation in typhoid fever in which the clinical diagnosis was confirmed by operation or autopsy, but I have never seen a peritonitis without perforation. I am fully aware of the fact that such cases have been recorded, but have never been so fortunate as to see one, and cannot bring myself to believe that they occur one-third as many times as peritonitis with perforation. Such peritonitis is usually due to rupture of some intra-abdominal or extra-abdominal form of infection, such as an infarct or an abscess of the

¹ Gazette des Hôpitaux de Paris, 1903, 375.

² American Medicine, 1903, 700.

spleen, but in a considerable number of cases no explanation of the peritonitis is found. It is believed possible for the bacteria to reach the peritoneum by propagation through the mucosa, by migration through a relatively intact intestinal wall, but usually the non-perforative peritonitis results from an extension of inflammation through the base of some deep ulcer. Meteorism, which Grawitz has demonstrated to have no effect upon intestinal walls which are intact, favors the migration of bacteria into the peritoneal cavity when the intestinal wall is ulcerated, and by decreasing the normal absorption powers of the peritoneum furnishes a secondary cause for this form of peritonitis.

It is possible for the peritonitis of typhoid to have a hæmatogenous origin, although there is no record of such a clinical experience, the only observation being a laboratory one by Gilbert and Girode. The non-perforative peritonitis is commonly caused by the typhoid bacillus, and the resulting inflammation may be local or generalized, serofibrinous, or purulent.

As would be expected, the symptoms of the non-perforative peritonitis do not differ from those of the perforative form, and, therefore, they cannot be distinguished clinically. The prognosis is as grave in one as in the other. The treatment is surgical, and should be adopted as soon as the diagnosis of peritonitis is made. Enterostomy is indicated when meteorism is marked enough to affect the prognosis. Escher has had such success with this procedure that others should be encouraged to employ it in appropriate cases.

Among adults suffering from typhoid fever one is not often called upon to consider the question of *meningitis*, for the meninges, like the other serous membranes, are not often involved, but among children the meningeal irritation or meningismus readily causes symptoms which suggest and are often taken for actual meningitis. Moizard and Grenet¹ state definitely that the two conditions cannot be differentiated clinically. Neither the pain nor the stiffness of the neck, nor Kernig's sign make a diagnosis possible, and the ocular disturbances, vomiting, alterations in the pulse, respiration and the course of the temperature are no longer regarded as valuable in the differentiation. Examination of the cerebrospinal fluid would seem to furnish a means of positive differentiation, but the examination of such fluid shows all manner of gradations, and suggest the possibility that there is in reality no fundamental difference in the nature of the cases.

ANTITYPHOID SERUM. One of the most important papers of the year upon typhoid, if, indeed, it is not the most important, is that of Chantemesse,² read before the Egyptian Medical Congress. He reports

¹ Archiv. de méd. des enfants, 1903, i, 1.

² Presse médicale, 1902, No. 103.

his personal experience with 186 additional cases of typhoid fever treated by an antityphoid serum, and contrasts his results with those of 1192 cases treated elsewhere in Paris during the same period, but without the serum. He lost seven of the 186 cases, giving a mortality of 3.7 per cent., while the mortality in the 1192 cases was 19.3 per cent. Chantemesse has previously reported 170 cases treated by this method, and adding to his 356 the 151 treated by Plaute and Foucault in the Naval Hospital of Toulon we have 507 cases of typhoid fever, all in adults, with thirty deaths, a mortality of less than 6 per cent. In all these cases the ordinary hydrotherapeutic measures were employed as they were in the other hospitals, only the serum being used in addition. The very best result which has been obtained in Paris by the hydrotherapy is 12 per cent., while the best result from the serum is 3.7 per cent. Chantemesse, while recognizing fully the beneficial influence of the cold baths, believes the additional reduction of mortality is the result of the serum.

The causes of death in the seven fatal cases of the last series of 186 cases is interesting and gives even a more favorable aspect to the report. One case had a severe intestinal hemorrhage and pneumonia, one had intestinal obstruction, three died from perforation, and two others died on the second and third day after entrance from the severity of the infection.

One of the most manifest effects of the serum is shown in the treatment of the local lesions of typhoid, such as otitis and periostitis occurring during convalescence, and sometimes causing prolonged suppuration. In several instances such complications healed very promptly under the influence of one or two drops of serum injected every five days into the region of the process.

Some experiments upon animals bring confirmatory evidence of the value of the serum. Typhoid bacilli injected into the ear of a rabbit grow as they would in a bouillon culture, but when injected into the ear of a rabbit which a few hours previously had been given a dose of serum the great majority of the bacilli are taken up by the phagocytes and destroyed. Thus the serum shows an anti-infectious influence. That it has also antitoxic power is shown by the difference in the changes in the organs of animals injected with typhotoxins, some of them having previously received an injection of the antityphoid serum.

Chantemesse realizes fully that 507 cases of adult typhoid do not settle this question definitely, but his results and the results of the animal experiments are such as would encourage one to continue until the question is settled.

Josias¹ reports an experience with the Chantemesse serum in the

¹ *Médecine Moderne*, xiv. No. 17.

treatment of fifty cases of *typhoid in children* with results almost exactly like those of the last series. The mortality was but 4 per cent., while children in other hospitals where the serum was not used showed a mortality of 14.2 per cent. The serum showed no undesirable side-effects. The action is the more favorable the earlier it is used. The course of the disease is not always shortened, and relapses are not always avoided. These cases combined with the others reported make 557 cases with thirty-two deaths, a mortality of 5.6 per cent.

From a widely remote part of the world comes a report of another *typhoid antitoxin* in which the results are very good, as far as one can judge from a short series of sixty-five cases. Mendez¹ reports upon the use of a typhoid antitoxin prepared by himself. The diagnosis in each case was confirmed by splenic puncture, and from his report it is evident that he regards this procedure as safe and reliable. He found that the course of the disease was shortened by the injection, and that the diazo reaction and albumin disappeared from the urine. From his way of putting it one would imagine he regards the disappearance of the diazo reaction as a sign of progress, although one may question the correctness of this inference. The effects of the antitoxin were not constant, and Mendez found that the earlier the serum was used the greater the effect, and that the influence is greater in mild than in severe cases. The second day after the injection there is some local reaction, and after forty-eight hours the temperature begins to fall, and in from five to seven days the general condition is normal. The roseola may remain after the temperature and pulse are normal. The spleen also may remain enlarged. In this series of sixty-five cases there was only one death, and that was due to intestinal hemorrhage. This report leaves one unimpressed. It may be a good thing, or it may be worthless. Many another method of treatment has been devised which gave equally good results in as small a series of cases, although it must be admitted that in this series the diagnosis was confirmed by modern bacteriological methods, and that many of the earlier reports of methods of treatment were impaired by the incompleteness of the diagnosis. It is too bad that Mendez says nothing of the nature of his serum, in order that others may try it. In these days of rapid communication any promising method of treatment of any of the serious epidemic diseases should be tested and proved good, or worthless, or bad in a very short time.

HOSPITAL TREATMENT OF TYPHOID FEVER. The old and well-tried methods of treatment called forth the usual number of papers during the year, but the only one to which reference will be made is

¹ Revista de la sociedad méd. Argentina, July and August, 1902.

that by H. P. Loomis,¹ in which he compares the routine treatment of typhoid fever and some other common diseases in four New York hospitals, the Presbyterian, New York, Roosevelt and Bellevue. The typhoid mortality in these hospitals was 10 per cent., a favorable contrast with many of the older statistics, and Loomis believes that the reduction of the mortality is due to the methods of treatment employed. The details of treatment are very similar in the four hospitals, the only difference of opinion being as to whether the diet should be exclusively milk or not, as to when and how the diet should be modified at the end of the disease, as to the temperature which calls for a Brandt bath, and over the question whether the bath should be used in all cases.

The routine treatment is as follows :

(a) The stools are disinfected with $\frac{1}{40}$ formaldehyde solution (the urine also should be disinfected); the clothing is soaked in 1:20 carbolic acid solution before being washed; the nurse uses a 1:1000 bichloride of mercury solution as a hand wash after attending the patients.

(b) The diet. (1) During the course of the disease should be milk exclusively, either with lime-water or peptonized. (2) At the end of the disease, with the temperature normal or under 100° C., soft-boiled eggs, chicken or beef sandwiches are added, and after the lapse of four days a chop may be given.

(c) Stimulation. When this is indicated by the condition of the heart, pulse, or general condition of the patient whiskey in half-ounce doses is used. If this fails to hold the patient strychnine is added. If the right heart fails and there are blue extremities with threatening œdema of the lungs, digitalis is added.

(d) The Brandt bath should be given in all cases where the temperature reaches 103° F., and should be repeated every four hours if necessary. Half an ounce of whiskey diluted should precede the bath, and a glass of hot milk follow it. The tub should start with a temperature of 70° F. and be reduced to 65° F. by means of ice. The bath should last about fifteen minutes, the patient being well rubbed all the time, and the head kept cool by means of an ice-bag. The 4 A.M. bath can always be omitted with advantage, and the 12 P.M. bath can often be.

(e) Special symptoms. (1) headache: use ice-cap, acetanilid, and caffeine; (2) sleeplessness: use trional; (3) constipation: no cathartic after the initial dose of calomel; if required, use a daily enema; (4) tympanites: use ice-coil, turpentine stupes, or turpentine, five drops, every three hours; (5) hemorrhage: limit the milk, stop the enemata,

¹ Medical Record, January 10, 1903.

apply an ice-coil, and give Majendie solution hypodermically ; (6) perforation : operate at once.

(f) Convalescence. Allow the patient to sit up after the temperature has been normal for one week, and to get up after it has been normal for ten days. Leave the hospital at the end of two weeks. The diet should be restricted up to the end of the third week and careful for three weeks more.

One can agree with this very fully, and any change which might be suggested must be admitted to be matters of opinions. If the exclusively milk diet is a matter of opinion, it would seem natural to consult the desires of the patient, and yield somewhat to the very great antipathy which many patients have to milk. I, personally, do not believe that the addition of meat juice, egg-nog, thin soup, fruit juices, thin jelly or gelatin, or some finely divided and partly dextrinized carbohydrate does any harm, and it certainly makes the long illness more endurable. I believe also that it hastens the convalescence. So far as the treatment of special symptoms is concerned, I believe that the headache rarely requires anything more than the ice-cap, and a few unhappy experiences have led me to fear the use of any of the coal-tar antipyretics. Tympany, which now is a rare thing, is very favorably influenced by the withdrawal of all food for twenty-four hours.

Pribram¹ reports upon the use of *gelatin injections* in the treatment of *intestinal hemorrhage*, using 20 c.c. of a 10 to 15 per cent. solution of gelatin in six cases. Twice the hemorrhage stopped after the injection, once the hemorrhage returned after an interval of a month, and this time also stopped after the injection. In the three other cases hemorrhage occurred just after the injection ; in one case only once, in another repeatedly, and in the third repeatedly to death the next day. These results are compared with those of sixteen cases treated in the same clinic previous to 1902. Of these eight stopped promptly (seven after tannic acid and one after an injection of ergotin) ; in four others the bleeding after being repeated several times stopped on the use of tannic acid, once used in combination with ergotin, and in the other four cases the hemorrhage was repeated in spite of the tannic acid, once causing death.

The results of the gelatin injection are too limited in number to justify any conclusion, but Pribram is inclined to think that the hemorrhages are shorter and less dangerous with the gelatin than without. There is nothing more difficult to justly estimate than the therapeutic value of a method employed in the treatment of internal hemorrhage. We can know nothing of the size of the bleeding vessel nor of its condi-

¹ Prager med. Wochenschrift, 1903, No. 20.

tion, and, therefore, can never say with certainty whether the bleeding stopped because of the treatment employed or stopped spontaneously. Only a very long series of cases can settle a question of this sort. From reading Pribram's reports one cannot see that the cases treated with gelatin did any better, if as well, as those treated by tannic acid. The tannic acid is certainly harmless, perhaps, even useless; but we cannot say the same in regard to the gelatin injections. The number of cases of tetanus which have followed the subcutaneous use of gelatin must make one pause and think. The gelatin can no doubt be perfectly sterilized, but unless this is properly done—and to do it properly requires several days—the gelatin had best be omitted. No hastily prepared solution of gelatin should ever be used, and, therefore, it is only in hospital practice, where the solution is kept constantly in stock, that this method of treatment can be employed.

Paratyphoid Fever. This disease and its relation to typhoid has called forth a considerable number of interesting and important contributions, and, while there is doubtless much to learn, still the case-reports are now numerous enough to enable one to make some generalizations. Pratt¹ reviews eighty-four cases reported, and added three unrecorded cases. The paratyphoid or, as some prefer to call it, the paracoln bacillus, occupies a position intermediate between the colon and typhoid bacillus, and presents some of the characteristics of each. Two species of the paratyphoid bacillus have been separated: the alpha and the beta; of these the latter is the more important. I think it a mistake to use, as some are doing, the name paracoln for this organism, for, no matter what reasons there may be from the viewpoint of a bacteriologist for this name, this organism, like other pathogenic organisms, has only one importance, its clinical importance, and because of the great similarity between the clinical pictures caused by the typhoid bacillus and this other, the names should be similar. No effort is made here to outline the difference between the alpha and beta organism, for so far there is no clinical difference between the action of the two known, and that there are two instead of one form of paratyphoid bacillus is manifest only to the bacteriologist.

The three unrecorded cases reported by Pratt are as follows: one a suppurative *orchitis* following what had been diagnosed as a typhoid, but which was shown by the presence of the beta paratyphoid bacillus in the pus to have been a paratyphoid; the second case was one of *cholelithiasis*, due to the bacillus paratyphoid beta following what four years previously had been diagnosed as a typhoid fever, and the third is a mild paratyphoid infection, with a *saphenous thrombosis*.

¹ Boston Medical and Surgical Journal, February 5, 1903.

The eighty-four cases have been reported from all parts of the world, and, while most of the cases are sporadic, the cases have occurred in epidemics, as is illustrated by the house epidemic reported by Feyfer and Kayser, in which fourteen cases developed in four families, or the still more remarkable barrack epidemic of thirty-seven cases reported by Hünemann. The cases were mostly in young adults, but they may develop at any age. Autumn is the period of greatest prevalence. The bacillus paratyphosus alpha was the causative agent in twelve cases, the beta bacillus in sixty-nine, and in three the organism was not differentiated.

The disease is a general infection, and so far only three deaths are recorded. In these the Peyer's patches and solitary follicles were normal; but inasmuch as there are five recorded cases of intestinal hemorrhage, it is probable that in some cases, at least, there are intestinal lesions. The spleen is enlarged. The fatal cases were all due to the beta paratyphoid bacillus. These pathological findings suggest that some of the reported cases of typhoid without intestinal lesions were really instances of paratyphoid instead of typhoid infections.

The symptoms of the paratyphoid infection are in many cases the exact counterpart of the typhoid. The course, however, is usually milder, may even be afebrile, and fever, when present, may end by crisis. Diarrhœa is more common than in typhoid. The duration of the disease varies from twelve to eighty-four days. The onset may be with chills. Epistaxis has been noted a number of times. Relapses, both first and second, have been recorded. Rose spots and a palpable enlargement of the spleen have been present in about one-half of the cases. Labial herpes has been noted twice. The pulse is usually slow and irregular. Complications are very common, and certain of them, very rare in typhoid, have been repeatedly seen in paratyphoid. Omitting the thirty-eight cases of Hünemann, the details of which have not been published, 40 per cent. of the cases showed complications. In the list are included pleuritis, endocarditis, meningitis, peritonitis, cholecystitis and cholelithiasis, orchitis, phlebitis, osteomyelitis, and others.

An absolute diagnosis can be made only when the paratyphoid bacillus is obtained from the blood, urine, feces or some local lesion, but in the light of present knowledge the diagnosis is justified if the blood agglutinates a paratyphoid bacillus in high dilution and fails to agglutinate the typhoid bacillus, or does so only in low dilutions. The prognosis is favorable, the mortality being apparently much lower than in typhoid, so far only 3.6 per cent.

While most of the cases follow a clinical course like the one outlined

below, abnormal types have been described. Thus Levi-Sirugue¹ quotes a case reported by R. Schmidt, in which the clinical course resembled that of a pyæmia rather than that of a typhoid. There were daily chills, with hyperpyrexia for two months. Diarrhœa, enlarged spleen, tachycardia, hemorrhagic nephritis, serous pleuritis, and profuse expectoration were the prominent features of the disease, which manifestly presents no resemblance to the ordinary results of infection with the paratyphoid. There was no headache, no disturbance of the sensorium, no roseola, no diazo, no increase in the number of leukocytes.

Ascoli reports a fatal case beginning with sore throat, aphonia, moderate splenic tumor. Otherwise the case was like that of R. Schmidt, recorded above.

Feyfer and Kayser² sketch the clinical course from an experience with an epidemic of fourteen cases which resembled typhoid, but in no instance showed the Gruber-Widal reaction. After a short prodromal stage of from one to four days there is anorexia, pain in head, back, and limbs. The fever is of the remittent or intermittent type, sometimes with morning and evening exacerbations. The pulse in general corresponds to the temperature. The tongue is more or less coated, some gurgling in the iliac fossa, and almost always a severe diarrhœa, with yellow and offensive stools. The spleen is usually enlarged, although often not palpable. The diazo reaction is often positive and indican abundant. Roseola is present in about one-half of the cases. The sensorium is usually unaffected. Angina is common at the onset, and bronchitis is a frequent complication. The average duration is about twenty days. The blood serum in all cases (that is all of this series of cases) agglutinate the beta paratyphoid.

The diagnosis can be made only by means of bacteriological methods, but may be suspected when any patient thought to be a typhoid presents any distinct variation from the ordinary type of typhoid fever or any of the complications to which typhoid is not liable.

Luscsch³ adds one more autopsy to the few already reported. His cases presented the clinical picture of a typhoid with the Widal positive at 1:40, but absent with higher dilutions. The serum agglutinated the bacillus obtained post-mortem up to 1:400 +. From the study of this case Luscsch sums up the pathological anatomy of the paratyphoid as follows: The paratyphoid is a disease which shares anatomically with other infectious diseases the enlargement of the spleen,

¹ *Archiv. générale d. médecine*, 1903, 1686.

² *Münchener med. Wochenschrift*, 1902, 1693.

³ *Centralblatt f. bakter. und parasit.*, 1903.

the parenchymatous changes in the organs, but in contrast to the typhoid shows a lack of any particular involvement of the lymphatic apparatus of the intestine. The intestines show at most only dysenteric changes.

Lusksch, however, is confident that cases of true typhoid occur without special changes in the intestines. The suggestion of Rion and Nagel that the cases of this sort reported are really instances of paratyphoid infection is refuted by the report of two certain cases of typhoid without intestinal localization observed during the time when this case of paratyphoid infection was being studied. Both of these cases were demonstrated at autopsy by culture to be true typhoids, but the intestines were unaltered.

Whooping-cough. CAUSE OF WHOOPING-COUGH. Jochman and Krause¹ report the discovery of a very small bacillus, much like that of the influenza, in the sputum and respiratory tract of numerous cases of whooping-cough in the Hamburg-Eppendorf Hospital. While morphologically very much like the influenza bacillus, this organism differs from it biologically and in its color reactions. The reporters believe that this organism is the cause of whooping-cough.

This work has been continued, and a later report shows that Jochman is strengthened in his opinion by additional observation. So far as I know, this work has not been confirmed by other observers, but in view of the importance of this disease the work no doubt will be.

Jochman,² together with Moltrecht, makes a report upon twenty cases of bronchopneumonia in whooping-cough patients due to an influenza-like bacillus, which he and Krause described in 1901 as the probable causal organism of pertussis. It is an oval organism about the size and shape of the influenza bacillus, sometimes occurring in pairs, but never in chains. It is non-motile, does not stain by the Gram method, and grows only upon media containing hæmoglobin. The authors have carried out their work since 1901, and found this organism in the lungs of twenty out of twenty-two cases of bronchopneumonia following pertussis. They found the same organism in the sputum of sixty cases of pertussis. This organism is certainly very closely allied to the influenza bacillus, but the authors believe that it is probably the cause of whooping-cough.

DIAGNOSIS OF WHOOPING-COUGH. Waustall³ has here an article upon the early diagnosis of pertussis from the blood findings. The importance of such early diagnosis is manifest when one recalls the assertion of some authors (Weill and Pehn) that the contagious period

¹ Zeitschrift f. Hygiene und Infektion., xxxiv., 193.

² Centralblatt f. Bakteriologie, 1903, xxxiii., 15.

³ American Medicine, January 10, 1903.

is during the bronchial or catarrhal stage, and that when the characteristic cough develops the likelihood of contagion is rapidly lessened, and by the eighth day of the paroxysmal period the possibility of contagion is over.

The diagnosis of whooping-cough during the catarrhal stage is extremely uncertain, and anything which renders certain diagnosis earlier is to be welcomed. Mennier has stated that there is a leukocytosis in whooping-cough coming on early, before the clinical symptoms are well marked, reaching its height during the paroxysmal stage, and then declining. The number may reach 40,000 and averages 25,000. The chief increase is in the lymphocytes, although all forms are increased. Waustall, recognizing the practical difficulties in the way of making in practice accurate blood counts from children, seeks to employ the lymphocytosis as an aid to diagnosis, making smears of blood, and after staining making a differential count of the forms of the white corpuscles. This was done with nineteen children suspected of being in the catarrhal stage of whooping-cough, and fifteen of these proved to be. In eleven of the cases of pertussis the lymphocyte percentage exceeded that of the polynuclear neutrophilic leukocytes (normally they number about one-half as many), and the average percentages of the various elements of the fifteen cases being: polynuclear neutrophiles, 43 per cent.; lymphocytes, 49.9 per cent.; large mononuclear and transitional forms, 4.9 per cent.; eosinophiles, 1.7 per cent. So far as the absolute number of corpuscles is concerned, counts were made in but five cases, and in these the numbers ranged from 4288 to 12,000, the average being 6698.

Stengel and White have reported three cases of pertussis in which the lymphocytes exceeded the leukocytes in number, and Cabot has a pertussis pneumonia showing 94,600 whites, 69 per cent. of which were lymphocytes.

While the number of cases is too small to warrant generalization, lymphocytosis would seem to be an important addition to the symptomatology of whooping-cough, and the more valuable because of its appearance during the first stage of the disease.

There have been a number of new remedies advanced for the treatment of whooping-cough, but in view of the many which have been tried and found wanting there is nothing especially promising among the new preparations.

THE DISEASES OF CHILDREN.

BY FLOYD M. CRANDALL, M.D.

THE NEWBORN INFANT.

The Mortality of Early Life. In an extended paper on this important subject Snow,¹ of Buffalo, presents some interesting statistics regarding mortality in the first weeks of life. The first month is the most dangerous period of human life, for nearly one-tenth of the race succumb during that time. Notwithstanding the advances that have been made in many departments of practice, the mortality among young infants remains very high. According to Eröss, among 1,439,000 births in sixteen large European cities, 9.5 per cent. of all the children died before the end of the first month. In Buda-Pesth the mortality in the first month is 8.11. Of these 37 per cent. die in the first week and 29 per cent. in the second week. Deaths during the first week are chiefly due to malformations, injuries of parturition, and asphyxia. After the first week infections cause the majority of fatalities. In Norway, which has the lowest infant mortality in the world, the death-rate steadily diminishes from 3.41 per cent. in the first month to 0.99 in the second, 0.56 in the sixth, and 0.40 in the twelfth. This diminution in the death rate in the succeeding months of the first year is observed in all countries.

Snow presents statistics derived from the city of Buffalo which is, no doubt, typical of North American cities. During 1902 there were 7290 births and 5080 deaths. Of the deaths 471 were in children under one month. Thus 9.30 of all the children born in Buffalo die in the first four weeks, and the death rate in the first month forms 6.4 per cent. of the total mortality. Of these children 182 (38.5 per cent.) died in the first twenty-four hours, 141 (30.0 per cent.) died in the second to seventh day of life, 78 (16.5 per cent.) died in the second week of life, 34 (7.3 per cent.) died in the third week of life, 36 (7.6 per cent.) died in the fourth week of life.

This certainly is not a normal or necessary mortality, for in Norway the death rate in the first month is 3.38 per cent., about one-third that

¹ Archives of Pediatrics, September, 1903.

of Buffalo. The records of a Norwegian country parish, Gloppen, have been carefully kept for two hundred years. From 1687 to 1711 the mortality in the first month was 12.87 per cent.; it has now fallen to 3.38 per cent., a diminution of about three-quarters. In Prague the mortality in the first month is 14.2 per cent.; in the Prague hospital it is 3.3, showing conclusively that the life of the newly born child is most favorably influenced by good midwifery and nursing.

In comparing the statistics of Buffalo with those of Eröss we see that the mortality in the first month is 9.3 per cent., which is about the same as in the Continental cities of Europe, 9.5 per cent.; but in comparing the length of life we notice that nearly double the number, 68.5 per cent., die in Buffalo in the first week, to 37 per cent. in Europe. The number dying from the seventh to the twenty-eighth day in Buffalo is 32.5 per cent., in Europe 63 per cent. We may, therefore, draw the conclusion that more children die with us from accidents of parturition and fewer from infections than in Europe. Many infants are born before the full period of gestation, but they die of atelectasis, infections, or meningeal hemorrhages. Absence of lesions does not indicate absence of microbes, which may be found in the fluids of apparently healthy tissues. A very large number of prematurely born, underweight babies, reported as dying of immaturity, die of pulmonary or gastroenteric infections, or of cranial hemorrhage.

The mortality in early life is due to (1) immaturity; (2) malformations incompatible with life; (3) asphyxia and atelectasis; (4) injuries of parturition; (5) and various infections.

Asphyxia and intracranial hemorrhage are most closely associated. The effect of prolonged difficult labor and abnormal presentations not only favors the aspiration of foreign substances into the lungs and paralyzes the medullary respiratory centres, but it also causes cerebral hemorrhages from traumatism, in the application of forceps, by the nipping of a cerebral sinus in the forcible moulding of the head. Further, the intense cerebral congestion of dystocia may cause the rupture of the very fragile vessels of the pia mater. Hemorrhage is, in fact, the most frequent lesion found in stillborn infants or those dying soon after birth. Dr. Herbert Spencer made a critical examination of 130 infants dying in the first hour of life. In 65 per cent. he found injuries to the brain, congestion, and hemorrhage. He considers the forceps the most frequent agent in producing hemorrhage; next, foot and breech presentations, softness of the skull, and relaxation of the sutures. He also discovered in many cases hemorrhages into the liver and suprarenal capsules, and pulmonary apoplexies. It is probable that a large number of children returned as dying of immaturity, insufficient vitality, asphyxia, and convulsions succumbed to intra-

cranial hemorrhage. Although cerebral hemorrhage is usually associated with dystocia, it may occur in small children who are easily born. There may be no sign of cerebral irritation. The infant may die suddenly without symptoms, or may show irregular respiration and slight cyanosis, simulating asphyxia or atelectasis. Mistaking the condition for an imperfect expansion of the lungs, the physician may wonder why his well-directed efforts at resuscitation are unsuccessful. Generally meningeal hemorrhage is the result of malpresentations and difficult labor. There is a series of convulsions, irregular breathing, cyanosis, opisthotonus, rigidity, quivering, and automatic movements. The majority of cases die before the fourth day. The convulsions may subside and the child suffer later from epilepsy or paralysis.

Slight hemorrhage may give rise to no immediate symptoms. Many cases of idiocy, dull mentality, epilepsy, hemiplegia, and diplegia trace their origin to intracranial injuries of parturition. The diagnosis of meningeal hemorrhage or internal hæmatoma of the meninges may be made with great accuracy, with the history of an external hæmatoma, difficult labor, and recurring convulsions. The treatment of intracranial hemorrhage is almost hopeless; even if the convulsions are relieved, the residual disabilities are not lessened.

The subject of infant mortality has also been studied very carefully by Freeman,¹ though he does not limit his observations to newborn infants. He considers chiefly the reduction of infant mortality in New York City and the agencies which have been instrumental in bringing it about. In beginning his study he presents the following very interesting table:

| INFANT MORTALITY. DEATHS IN FIRST YEAR PER THOUSAND INFANTS. | |
|--|---------|
| Norway and Sweden | 106.157 |
| England | 154. |
| France | 169. |
| Prussia | 217. |
| Italy | 220. |
| Hungary and Austria | 254.258 |
| Bavaria and Württemberg | 317.329 |
| United States in 1900 | 159. |
| New York City in 1902 | 168. |

In the United States, according to the last census, the mortality of the first year was 159.3, while the cities of the country showed a mortality of 184.7. This was a marked improvement over the census of ten years before, since the total infant mortality of the country had decreased from 246.30 to 159.3, and that of the cities from 303.86 to 184.7. In New York State the mortality in 1900 was 159, about the

¹ Medical News, September 5, 1903.

same as for the country, and materially more than that of the cities of the United States. The mortality of colored infants is more than twice that of white infants. Thus, in the last census it was 397.2 in cities as compared with 180.4 for white children. The infant mortality of New York City has been very materially reduced during the past twelve years, the mortality from summer diarrhoea in 1892 having been more than double that in 1902. Ten years ago the infant mortality of New York City was higher than that of many European countries, but the present mortality of 158 is lower than that of most European countries, and, indeed, than that of many smaller cities of the State. Although many local influences have been at work to reduce infant mortality, it is evident that an important agency is one which applies throughout the country, for there has been a universal diminution of the death rate. A definite example of the diminution in mortality from the Pasteurization of milk occurred in the Infants' Hospital on Randall's Island, where the mortality in 1897 with raw milk was 44.36, while in 1898 with Pasteurized milk it was 19.80. The importance of this factor cannot be too strongly emphasized at the present time when many physicians seem inclined to revert to raw milk. The control of the city milk-supply by the Board of Health may well be cited as an important factor in reducing infant mortality. Although the Board of Health had been active previously in its endeavor to secure good milk, its exertions became much more vigorous in 1892, from which date a steady decline in the death rate ensued. A second important agency in securing suitable nutriment for the bottle-fed babies is the Straus Milk Charity. Organized in 1893, the year in which the decline in the death rate began, with an output of 30,000 bottles, it supplied in 1894 300,000 bottles, in 1895 600,000 bottles. The output remained about the same until last year, when milk certified by the Milk Commission of the County Society was used by them, and the demand reached 1,200,000 bottles, this enormous increase in distribution being accompanied by a diminution in infant mortality. New York City certainly owes to Nathan Straus a great debt of gratitude for inaugurating and carrying out, at his own expense, this most valuable aid to its tenement-house babies.

The next agency in importance in the reduction of infant mortality seems to Freeman to be the work of the St. John's Guild. This organization supports admirably equipped hospital-boats which make trips down the bay to the south shore of Staten Island, where an excellent hospital receives the very sick cases. Twelve trips are now made by two boats each week, and take about 18,000 babies every summer. There can be no question that a further important agency has been the methods of street cleaning and garbage removal inaugurated by

Colonel Waring, who was appointed Street Cleaning Commissioner in 1895.

In finishing this very important study the following conclusions are drawn by Freeman: The infant mortality of all countries is shockingly high, and this is shown to be unnecessary by the fact that infants that are well cared for show a very low mortality. The influences that contribute to the high mortality are defective feeding, with heat, humidity, and bad surroundings as contributory causes. There has been a marked decline in infant mortality during the past ten years in the United States and especially in New York City, due, for the most part, to the decline in mortality from summer diarrhoea. This striking decline in infant mortality is due to many agencies. The general adoption of Pasteurizing and sterilizing milk for infant feeding is by far the most important of these. Other agencies in New York City are the improved city administration, the milk inspection of the Department of Health, the Strauss Milk Charity, the fresh air work of St. John's Guild and similar charities, cleaner streets and asphalt pavements, the new small parks, play-grounds, and recreation piers, improved tenements, and the use of diphtheria antitoxin.

Septic Infections. The cases reported by Snow¹ show that a large proportion of fatalities among infants results from sepsis. The avenues of infection are numerous, and include the eye, ear, nose, mouth, skin, digestive and respiratory tracts, and umbilicus. The germ may be anyone of the pathogenic bacteria. The patient's resistance to disease is very slight, probably owing to deficient leukocytosis and defective development of the lymphatic apparatus. When puerperal fever prevailed infants were frequently infected by their mother's milk. In Prague, after the introduction of antiseptic methods in the hospital, the mortality of the newborn sunk from 30 per cent. to 5 per cent., and the number of feverish children from 45 per cent. to 11.3 per cent. Indeed, the conditions are often more favorable for infant life in a fine hospital than in the ordinary dwelling. According to Birch-Hirschfeld prenatal infection, except for lues, is almost impossible. The healthy placenta is a perfect filter for germs. It is only when the placenta is diseased or saturated with bacteria that infection is possible. It is favored by partial detachment of the placenta or frequent hemorrhages. The greatest source of danger is the amniotic fluid after the bag of waters is prematurely broken. The amniotic fluid is polluted by the examining finger or by an ascending infection. The fluid is aspirated into the lungs or swallowed, and the infection may become general or localized in the respiratory or gastroenteric tract.

¹ Loc. cit.

The germ is generally the colon bacillus. A period of incubation may occur, and several hours or a day or two may elapse before symptoms appear. Whatever be the microbe or portal of invasion, the infection soon becomes general, and nearly every autopsy will reveal pneumonia. The general clinical picture is fever, cyanosis, rapid breathing, convulsions, vomiting, and diarrhoea, while the mother is generally well and free from fever. In a prematurely born child a virulent infection may exist without a rise in temperature. Most cases of sudden death may be explained in this way; there is no ability to defend the organism against toxins. Though it is usually stated that the umbilicus is the vulnerable point, it is doubtful if many infants' deaths are due to this cause. It is possible that the condition is more frequent, owing to the fact that physicians are slow to acknowledge that a preventable disease has occurred in their practice.

Inflammation of the respiratory tract is excessively common in the first month. The disease may start from purulent coryza, an imperfectly expanded lung, or pulmonary apoplexy. The infection may come from foul atmosphere, unclean bedding or mattress, as seen in the Heidelberg epidemic, where an epidemic of eight cases arose from staphylococci in straw beds, but is more frequently caused during parturition by the aspiration of amniotic fluid contaminated by the colon bacillus, streptococcus, or staphylococcus. Delestre states that the majority of autopsies in prematurely born children show a hemorrhagic bronchopneumonia causing almost absolute obstruction of the bronchial tubes. There are often, however, but few of the characteristic signs of pneumonia. Richter, of Vienna, in 1525 autopsies upon children dying in the first month, found the most frequent cause of death was capillary bronchitis, which killed by asphyxia. The bronchitis was occasionally associated with bronchopneumonia or intestinal catarrh. As to other causes of sudden death, Epstein said the diagnosis of hypertrophy of the thymus was a term used to mark our ignorance of the real cause of death.

Gastroenteric infections at birth are occasionally seen, but receive small mention in the text-books. In Buffalo, in 1902, there were among infants under one month thirty deaths from acute gastroenteric disease, and forty from marasmus and inanition, making 16 per cent. of the total mortality under one month. With some children a congenitally imperfect digestion exists, the digestive ferments are weak, the congested gastroenteric tract is coated with mucus, and autointoxication or infection readily occurs. Vomiting, diarrhoea, and colic are easily excited, and may be due to mere dyspepsia, to grave gastroenteric infection, or autointoxication, or to general sepsis. Delestre describes a chronic infection causing infantile atrophy or athrepsia.

Snow summarizes his excellent paper with the statement that the diseases of the newborn are little studied or understood. The high mortality of the first month could be much lessened if the unnecessary use of the forceps were avoided and surgical cleanliness was observed about the child as well as the mother.

Another excellent paper on infections of the newborn is that of Hamill and Nicholson.¹ These authors do not accept as pathological entities melæna neonatorum, hemorrhagic disease of the newborn, Buhl's disease, Winckel's disease, hæmophilia of the newborn, etc. All the clinical manifestations described under these headings may exist as evidence of any one of a number of different infections, the nature and severity of the symptoms depending upon the character and virulence of the infecting organism and the degree of the individual resistance. In the light of our present knowledge, and for the purposes of simplicity and to stimulate investigation, they would include all these conditions under the term: *infections of the newborn*. If any attempt at classification is to be made to-day it must be made on a purely bacteriological basis. Hemorrhagic conditions in the newborn may in certain instances be due to some of the causes formerly held accountable for all such manifestations. Among these may be mentioned birth trauma, fetal malformations, asphyxia, and syphilis. In the vast majority of instances, however, hemorrhages may be considered as symptoms of an infectious condition, although bacteriological studies, while proving the case infectious, have commonly failed to demonstrate the presence of the same micro-organisms in all of the cases. In the six cases recorded by the authors six different micro-organisms were isolated, viz., the bacillus pyocyaneus, the bacillus lactis aërogenes, the colon bacillus, and staphylococcus aureus, the bacillus coli immobilis, and a streptococcus. In their complete list of cases, amounting to about fifteen, only one other micro-organism, an unclassified micrococcus, has been encountered. The literature, however, contains instances of infection by the pneumococcus and other germs.

It is impossible to definitely fix upon the port of entry. The buccal cavity, the tonsils, pharynx, and the remainder of the alimentary tract are the most common. Next in order are the lungs. The authors believe that the cord has been given too great prominence, as the point of entrance and the other avenues—skin, conjunctiva, nose, ears, and urogenital tract—are rarely responsible. As to the diagnosis of these conditions, any elevation of temperature, notwithstanding the frequency of fever at this age, should arouse suspicion. It may be the only

¹ Archives of Pediatrics, September, 1903.

evidence of the condition for several days. In most cases enteritis is an early symptom ; and next, perhaps, is the occurrence of the papular or papulovesicular eruption involving the skin of the face, neck, shoulders, and forearms. If, therefore, one observes this combination—fever, greenish mucous stools, a skin eruption of the character described, and rapid emaciation—one is justified in considering the condition infectious. If to these manifestations are added hemorrhage, nervous phenomena, cyanosis, and rapid irregular respiration, the evidences of an infectious condition are complete. Definite information as to the character of the infection can be obtained by cultures made from the blood. It is evident that prevention is, to a great extent, possible, and that this is to be accomplished by measures directed toward the improvement of the general aseptic technique. In the construction of maternity hospitals every effort should be made to ensure ease of cleanliness. Only the necessary attendants should be admitted to the wards. They should wear overgowns or large aprons and cuffs, which should be changed daily. Each morning before entering the wards their hands should be scrubbed for at least five minutes with soap and water, and washed again immediately after changing beds or napkins or handling the bed-pan, and always before handling the infants. The infants should be kept in separate wards from the mothers, and be in charge of a special nurse. The resident and attendant physicians should follow the same precautions suggested for the nurse. The cord should be tied with an aseptic ligature by aseptic hands before it is severed, and immediately dressed with a sterile dressing. The advisability of the routine measure of cleaning the infant's mouth is to be questioned unless it is to be done under the most aseptic conditions.

The nurse who has handled the bedding of a patient, treated a fissured breast, emptied a bed-pan, or changed a napkin, unless she be most careful in preparing her hands, may readily infect the mouth of the infant. The condition of the breasts of the mother should be most carefully studied. The recognition of erosions, fissures, or any other pathogenic condition should result in the immediate withdrawal of the infant. The common custom of suckling the infant under these conditions is greatly to be condemned. The normal breasts and surrounding areas should be most carefully cleansed before and after each nursing. Infants should not be permitted to suckle mothers suffering from puerperal septicæmia. When cases of infection in the mother or infant occur the wards which they have occupied should be closed and fumigated. When infection is once established there is little that can be done for these patients in the way of treatment. Especial care should be exercised as regards the nourishment, and the strength of the infant should be sustained as far as possible.

In discussing this subject Koplik¹ expressed his disapproval of the universal custom of washing the baby's mouth. The membrane is easily abraded, and bacteria may be introduced. If the breast and nipples are thoroughly cleaned before and after nursing there can be little necessity for washing the mouth. Rotch reported a case of infection which he believed was caused by a fissured nipple with its bacterial contents. He expressed the belief that this is not uncommon. Shaw also reported a case of fatal infection which showed no gross lesion, but two or three varieties of pus-forming germs were found in the blood. Holt² reports a case of fatal septic infection marked by extensive hemorrhages of the skin. The autopsy showed purulent meningitis. A pure growth of the staphylococcus pyogenes aureus was obtained from the spots on the skin as well as from the blood of the heart and liver and from the pus on the brain. The point of infection was apparently the umbilicus. A case of sinus thrombosis resulting in extended cerebral hemorrhage in an infant fifteen days old is reported by Hamill.³ A bacillus resembling the colon bacillus, but not identical with it, was found on culture. The umbilicus was apparently the portal of entrance.

Disturbances of Respiration. The form of respiratory disturbance which first confronts the practitioner in his attentions to the newborn is asphyxia. Closely associated with this is congenital atelectasis. These two conditions may be included under the general heading of respiratory failure. In a paper on this subject W. Reynolds Wilson⁴ enumerates deficient action of the abdominal muscles, traumatism, especially that which results from intracranial hemorrhage, and toxic infections, the latter of which may result from alimentary disturbances. The dyspnoea which occurs in these cases may result from malformation, pneumonia, stenosis of the larynx, enlarged thymus, alimentary disturbances, and several other causes. In the paper already referred to, Snow⁵ says that asphyxia, atelectasis, and compression of the cord cause 3.6 per cent. of the total mortality of the first month of life. Asphyxia and cerebral hemorrhages are usually caused by dystocia, and have in common the symptoms of prostration, cyanosis, and irregular breathing. Asphyxia is ordinarily relieved completely by artificial respiration, but a number of cases are seen where treatment is only able to effect a partial expansion of the lungs; the infant lives for days and weeks with from one-third to one-fourth of its lungs in working order. It is feeble, has a subnormal temperature, and will not cry or nurse; it breathes rapidly, and suffers from frequent cyanotic

¹ Archives of Pediatrics, September, 1903.

² Ibid., February, 1903.

³ Ibid., September, 1903.

⁴ Ibid., April, 1903.

⁵ Ibid.

attacks, in one of which it may die. In congenital atelectasis there may be an easy labor and no asphyxia, but from inherent weakness or immaturity of the respiratory muscles and nerve centres, the baby will not expand its lungs. It leads a cold, cyanotic, vegetative existence, refuses food, and is apt to die suddenly in an attack of cyanosis. In both asphyxiated infants and those suffering from atelectasis there is feeble or absent breath sounds at the bases of the lungs. Underweight children or those born asphyxiated should be occasionally auscultated and closely watched. With lividity and rapid or irregular breathing, oxygen, mustard baths, artificial respiration, forced feeding, and hypodermic stimulation should be used with vigilance. A large number of these cases may be saved. Both asphyxia and atelectasis are fertile causes of bronchopneumonia.

Hemorrhages. The subject of hemorrhages of newborn children is discussed by Abt.¹ He reports twelve cases, of which eight died. There has recently been a tendency to ascribe these cases to bacterial infection. Numerous organisms have been found, but it is improbable that there is a specific germ. Among the recent treatment proposed is injection of a 2 per cent. solution of gelatin in normal salt solution. From 25 to 50 c.c. of such solution may be given to a newborn child and repeated daily. This measure is warmly recommended, and there can be no objection to its use. In syphilitic cases vigorous specific treatment should be given. The gelatin treatment is particularly commended by Holschmidt,² who reports five cases of *melæna neonatorum* treated by hypodermic injections of 15 c.c. each. The hemorrhage was checked in each case after the first or second injection, and all five patients recovered. Of the previous fourteen cases in the same clinic which were not treated by gelatin seven were fatal.

The treatment of *melæna neonatorum* and other forms of hemorrhage by suprarenal extract has been highly successful in some cases. Tuttle³ reports the case of a child who vomited blood freely and passed tarry stools. The bleeding ceased soon after beginning the administration every four hours of five drops of the 1 : 1000 solution of adrenalin chloride. I considered this subject at considerable length two years ago, and also last year.⁴ Parry⁵ reports good results from the use of a 30-grain solution of calcium chloride in bleeding from the mouth in a hæmophilic boy. Garcin⁶ reports an unusual case of secondary hemorrhage of the umbilicus. The cord separated on the

¹ Journal of the American Medical Association, January 31, 1903.

² Münchener med. Wochenschrift, January 7, 1903.

³ St. Louis Courier of Medicine, March, 1903.

⁴ PROGRESSIVE MEDICINE, March, 1902, and March, 1903.

⁵ Lancet, February 21, 1903.

⁶ American Medicine, January 10, 1903.

sixth day, leaving a healthy surface. Hemorrhage began on the eighth day and the child died, although the hemorrhage was soon checked.

Sclerema Neonatorum. This is a rare disease in well-to-do private practice. Stillman¹ asserts that it is most commonly seen in the ill-developed inmates of foundling hospitals and among weak and premature infants. Although it commonly develops during the first ten days of life, its appearance may be delayed until the seventh month.

Prenatal Rigor Mortis. It is stated by Paddock² that rigor mortis may occur before the birth of a child. Many of the child's voluntary muscles are completely developed before its birth. Rigor mortis results from coagulation of muscular albumin. It is entirely reasonable to believe, therefore, that rigor mortis may occur in a dead fetus. There is abundant clinical evidence to prove that this is a fact. This may be important both from a clinical and a medicolegal standpoint. Rigor mortis in a newborn infant is an evidence that it was alive shortly before or during birth. Post-mortem changes may occur in the dead fetal as well as in the dead adult body, and are the results of the action of the same laws. It is possible that the condition may retard delivery by interfering with its normal mechanism.

Temperature of the Fetus. Observations upon fetal and maternal temperatures in thirty-three cases are reported by Champion.³ It has been commonly asserted that the temperature of the fetus is but little, if any, higher than that of the mother. This observer, however, concludes that the temperature of the fetus *in utero* is higher than that of the mother. The exact amount of disparity is impossible to determine, because during the process of the expulsion of the child its temperature is already beginning to fall, the result of loss of heat radiated by the skin; immediately after birth the rectal temperature of the child still shows an average excess of 1° F. over that of the mother. The raised temperature never persists, but immediately and rapidly falls in the next fifteen to twenty minutes. The heat loss must have undoubtedly occurred by the skin and from the lungs. In no case was a bath administered to the child until after the observations were concluded.

INFANT FEEDING.

It is quite natural that the subject of the feeding of infants should be of great interest to pediatric practitioners. The number of papers discussing it are always large, and many are of great merit. The

¹ Journal of the American Medical Association, April 25, 1903.

² American Journal of Obstetrics, August, 1903.

³ British Journal of Obstetrics, June, 1903.

necessity for artificial feeding is undoubtedly increasing. We find each year a number of papers strongly urging the necessity of maternal nursing. One of the strongest recent pleas for such nursing is that of Winters.¹ He believes that there are few mothers who cannot nurse their children if they take proper diet before confinement and receive proper attention during and after that period. Lactation is advantageous not alone for the child but for the mother, as it aids in perfecting the post-partum changes. Notwithstanding his strong belief in the importance of maternal nursing, Winters weans much earlier than most practitioners do. He does not believe in lactation for eight or ten months, but would wean, as a rule, at the end of two months. It must be said, of course, that he is almost alone in this view. Most authorities hold that eight or ten months is not too long a period when the milk supply is abundant and the child is gaining in weight.

Some excellent suggestions regarding the feeding of infants during the earliest weeks of life are given by E. V. Davis.² She considers the matter from the obstetrician's standpoint, for he is the one who must start the feeding of the baby. She does not believe in cutting the cord until pulsation has ceased, having observed that the increased supply of blood renders the child less hungry and better able to pass through the first three or four days. Methods of nursing should be supervised by the physician, and the milk should be analyzed if the child does not thrive.

Some extensive examinations designed to show the comparative effects of alkalies when added to breast milk and cows' milk are reported by Kerley, Gieschen, and Myers.³ They conclude that breast milk and cows' milk are both acid. The litmus test for milk is unreliable, because of the variation in the quality of litmus paper and the litmus taking part in the reaction and not acting as an indicator. The effect of adding lime-water or bicarbonate of soda to feedings is to retard or inhibit the formation of curds by rennet. The teaching that lime-water, carbonate of sodium, or bicarbonate of potassium should be added to fresh milk or feedings simply because they are antacids is erroneous. The addition to milk or feedings of alkalies or salts that become alkaline in solution is an empirical method of aiding digestion by preventing the formation of dense curds that would slowly leave the stomach and be difficult of digestion in the intestines.

There are certain principles in dietetics that are fairly well established. Among these are that a certain minimum quantity of digestible proteid is needed by each animal, and also certain quantities of

¹ Medical Record, March 7, 1903.

² Journal of the American Medical Association, June 20, 1903.

³ Medical Record, August 8, 1903.

carbohydrates and fat to supply energy and heat. Working upon this theory, therefore, Chapin¹ attempts to evolve certain principles of infant feeding based on the evolution of mammals. He calls attention to the fact that in the process of mammary development the young animal at first receives readily absorbable food. As the mammary secretion changes from colostrum into milk, the motility of the stomach is developed through the milk changing into a soft solid which can easily pass into the intestine and which is the prototype of chyme. As the pepsin and hydrochloric acid begin to be secreted, the milk curds are toughened by the acid, and the pepsin then attacks them. By the time the teeth appear the functions of the stomach are so well developed that the young animal can eat and digest with its mother. The milk of each type of animal curds in such a way that it will develop the motor and digestive functions peculiar to that type of animal, and it is for this purpose that the proteids which produce the curds differ. From these facts it seems valuable principles may be deduced which will tend to simplify the teaching of infant feeding. An infant undergoes three stages of development and nutrition: (a) pre-placental; (b) placental; (c) mammary, and should be looked upon as attached to the mother in all three. At the beginning of the mammary stage the infant has only the rudiment of the true stomach. During the period of mammary development the mother first changes the character of the infant's food from colostrum to milk, and then the infant's digestive secretions so change the character of the milk that, as the digestive juices increase in quality and strength, the work of digestion is not thereby lessened but rather increased, as the stronger the gastric juice becomes the tougher the milk curds become, owing to the acid combining with the curds. The milks of all animals will produce good tissue. They differ in composition according to the rate of growth of the young animals. Their proteids differ in character with the type of digestive tract they are to develop. No known method of procedure will convert cows' milk into human milk. All methods of artificial feeding must have in view the production of food that will adapt itself to the developing digestive tract. All substances aside from breast milk are foreign to the infant's digestive tract, and may at times cause disturbance. In artificial infant feeding certain minimum quantities of digestible proteid, fat, carbohydrates, and mineral matter are needed. The mean composition of breast milk will serve as a guide to the nutritive requirements of infants. Milk must be the basis of an infant's food, not alone because it contains animal proteid, but because it contains the only available form of proteid that possesses

¹ Archives of Pediatrics, July, 1903.

the function of developing the digestive tract. The proteid of cows' milk, which was intended to develop the calf's stomach to digest grass, must be modified or adapted to the infant's stomach. This may be done by chemically or mechanically altering the character of the curds, by diluting milk with either alkalies or gruels. When for any reason a sufficient quantity of the proteid of cows' milk cannot be given it must be supplemented by other forms of nucleoalbumins until the normal quantity can be digested. It is a gross error to feed too low proteids of milk simply to overcome digestion.

Rotch,¹ in an extensive article on the essential principles of infant feeding and modern methods of applying them, gives comparative analyses of the milk of various breeds of cows, and enters upon the discussion of the various methods of modifying it. He urges strongly the principle that feeding is an individual problem; that each case must be studied by itself. He strongly condemns the use of proprietary foods which are used without milk, and, as would be expected, commends the use of the laboratory when it is available. Successful feeding consists in beginning with a weak mixture and gradually increasing its strength. He has frequently been successful with the split proteids when other methods have failed. In reviewing the essential principles of infant feeding Pisek² asserts that cows' milk cannot be made into human milk by adjusting the percentages of its ingredients. The proteids of cows' milk which cause the greatest trouble in infant feeding consist of five bodies, and are not simple casein or caseinogen and lactalbumin. The proteids of human milk are also mixtures of different proteid bodies and behave differently from the proteids of cows' milk with reagents. The curds of cows' milk and human milk differ markedly, and this difference cannot be overcome by diluting milk with water. The curds of milk play an important part in the development of the digestive tract, and for this reason milk of some sort must be the basis of an artificial food. The addition of lime-water or bicarbonate of soda retards the action of the rennet and prevents the formation of curds until some strong acid has combined with the lime or carbonate of soda. Heating the milk alters it chemically, so that less dense curds form. In preparing an infant food care must be taken to supply sufficient fat, proteids, sugar, mineral matter, and water. A baby can usually digest sufficient fat and sugar, but has difficulty with proteids. Too great a reduction of proteid will cause the infant to become anæmic and rachitic, although it may gain in weight from the fat and sugar in the food. Cows' milk is made more digestible by diluting it with digested gruels which, at the same time, increase the

¹ Journal of the American Medical Association, August 15, 1903.

² Vermont Medical Monthly, April 25, 1903.

amount of nutriment the infant receives. When the food cannot be kept below 60° F. it should be Pasteurized. No fixed rule for infant feeding can be given; each case must be studied by itself. In cases of vomiting and diarrhoea stop all milk feedings, clean out the digestive tract, feed digested gruel, and begin milk feeding gradually.

The error of using food deficient in proteids is the subject of a paper by Adriance.¹ Non-nitrogenous foods include fats and carbohydrates, and are simply of value as fuel supplying combustible material for the production of heat and motion; nitrogenous food has a higher function, namely, that of a tissue builder and repairer. Whereas, the fats and carbohydrates are nothing more than so much tinder which, quickly consumed, leaves no trace of itself, the proteids have the vital spark which characterizes protoplasmic activity. They are the backbone of the food, and upon their sufficient supply not only depend the strength and proper development of the infant, but its very life. The profession has been warned so often against increasing the amount of proteids, on account of possible digestive disturbances, that they appear to be too careful in their administration, and by guarding against gastrointestinal symptoms they often commit the other error of starving the child of nitrogen, which results in a nutrition below par. Starvation of proteids means backward development—the child sits late, crawls late, walks late. There is fretfulness, peevishness, a tendency to perspire about the head, delayed dentition, and tardy closure of the fontanelles and sutures; in fact, the symptoms of beginning rickets. Rickets is a chronic disease of nutrition, falsely considered as purely a disease of the osseous system. It is ushered in by just the symptoms of malnutrition described.

Of the numerous methods devised during the last few years to render easy the home modification of milk, one of the most clever and practical is that of J. F. Connors.² By means of a table which can be carried in a card case the various facts necessary for making up milk mixtures may be obtained.

To make up a mixture of any desired composition look in the proteid column for the desired percentage, then move in a horizontal line to the left until the desired percentage of fat is reached. The heading of the fat column will show what milk must be used, and the first column the dilution, or what proportion of the mixture this milk must be. Look in the sugar column for the percentage of sugar in the diluted milk. The difference must be added to the feeding mixture, using the nearest whole number instead of fractions in the calculation. One part sugar to twenty parts food adds 5 per cent.; one part sugar to twenty-

¹ Archives of Pediatrics, August, 1903.

² Ibid., March, 1903.

five parts food adds 4 per cent. ; one part sugar to thirty-three parts food adds 3 per cent. ; one part sugar to fifty parts food adds 2 per cent.

| Proportions of milk and diluent in feeding mixtures. | | Per cent. fat. | | | | | | | | Per ct. proteids | Per ct. sugar. |
|--|----------------------------|----------------------------------|-------------------------------------|---|--|--|--|---|--|---|--|
| | | Skimmed milk fat about 1 per ct. | Good whole milk fat about 4 per ct. | Top 20 oz. fat 6 per ct. (1½ times whole milk). | Top 16 oz. fat 8 per ct. (2 times whole milk). | Top 11 oz. fat 10 per ct. (2½ times whole milk). | Top 9 oz. fat 12 per ct. (3 times whole milk). | Top 8 oz. fat 14 per ct. (3½ times whole milk). | Top 7 oz. fat 16 per ct. (4 times whole milk). | For skimmed, whole, or top milk, 3.25 per ct. | For skimmed, whole, or top milk, 4 per ct. |
| 1 + 7 | Parts milk. Parts diluent. | 0.13 | 0.50 | 0.75 | 1.00 | 1.25 | 1.50 | 1.75 | 2.00 | 0.41 | 0.50 |
| 1 + 6 | | 0.14 | 0.57 | 0.86 | 1.14 | 1.43 | 1.71 | 2.00 | 2.30 | 0.46 | 0.57 |
| 1 + 5 | | 0.17 | 0.67 | 1.00 | 1.33 | 1.67 | 2.00 | 2.34 | 2.67 | 0.54 | 0.67 |
| 1 + 4 | | 0.20 | 0.80 | 1.20 | 1.60 | 2.00 | 2.40 | 2.80 | 3.20 | 0.65 | 0.80 |
| 1 + 3 | | 0.25 | 1.00 | 1.50 | 2.00 | 2.50 | 3.00 | 3.50 | 4.00 | 0.81 | 1.00 |
| 1 + 2 | | 0.33 | 1.33 | 2.00 | 2.67 | 3.33 | 4.00 | 4.66 | 5.33 | 1.08 | 1.33 |
| 2 + 3 | | 0.40 | 1.60 | 2.40 | 3.20 | 4.00 | 4.80 | 5.60 | 6.40 | 1.30 | 1.60 |
| 1 + 1 | | 0.50 | 2.00 | 3.00 | 4.00 | 5.00 | 6.00 | 7.00 | 8.00 | 1.63 | 2.00 |
| 5 + 3 | | 0.62 | 2.50 | 3.75 | 5.00 | 6.25 | 7.50 | 8.75 | 10.00 | 2.03 | 2.50 |
| 2 + 1 | | 0.67 | 2.67 | 4.00 | 5.33 | 6.67 | 8.00 | 9.33 | 10.67 | 2.16 | 2.67 |
| 3 + 1 | | 0.75 | 3.00 | 4.50 | 6.00 | 7.50 | 9.00 | 10.50 | 12.00 | 2.44 | 3.00 |

A system in some regards similar to the one just described is proposed by Ladd.¹ He has prepared a small card, to be carried in the pocket-book, containing the various data required in making up these mixtures. The essential principle underlying the American system of infant feeding, now generally accepted by pediatricists, is that it is not intolerance for cows' milk as such which causes so much disturbance in infants, but the inability of the individual child to digest certain ingredients of the milk. In other words, there is a variable inability on the part of the infant to digest the fats, sugar, and proteids of cows' milk, producing what may be spoken of as fat indigestion, sugar indigestion, and proteid indigestion. Any one or all of these three elements may be responsible for the gastroenteric symptoms in an individual child, even when the purity of the milk, which is of the first importance, is assured. Townsend,² of Boston, in writing upon the use of cream for the home modification of milk, concludes that centrifugal cream is probably less desirable for infant feeding than gravity cream. As obtained from dealers it is often inaccurate in percentage. Siphonage for obtaining gravity cream is an accurate method, but one requiring considerable skill to perform accurately and safely. Dipping off the top milk is an accurate and safe method if reasonable care is used. By this method it is possible to obtain cream of any desired percentage up to 26 per cent. To ensure perfect accuracy frequent examinations with the Babcock machine are required; but for practical purposes this is not necessary, provided the mixed milk from a well-regulated dairy is obtained.

¹ Boston Medical and Surgical Journal, January 1, 1903.

² Ibid., April 16, 1903.

The question of heating milk to be used by infants is still somewhat discussed. There are but few authorities who advocate sterilizing by high temperature. Daniloff¹ opposes its use for various reasons, but particularly because, as he alleges, ordinary sterilizing does not kill all the bacteria. This result can only be obtained by temperatures which spoil the milk for feeding. Cleanliness in preserving and handling the milk are far more desirable. Douglas² believes that as yet we have no evidence of sufficient weight to permit us to be neglectful of precautionary measures against tuberculous infection by milk. A good working rule is that all milk used for infants under one year of age should be Pasteurized for fully forty minutes at 70° C. (154° F.). No milk containing any preserving agent should be used for a young child.

Graham³ calls attention to the fact that Pasteurization or the heating of milk to 140° F. for twenty to thirty minutes has practically replaced sterilization. This temperature destroys the typhoid, diphtheria, and tubercle bacilli and all of the bacteria in milk except, perhaps, 2 per cent. The changes in milk produced by sterilization are not noticed in Pasteurization. It seems certain that the future of infant feeding will show very little milk heated, simply because heat in any form will be unnecessary. When children can secure pure milk containing no more than 2500 bacteria to the cubic centimetre, free from all foreign matter and all pathogenic bacteria, when this milk is properly transported and always kept cold, we will see aseptic milk and unheated milk, just as we now see aseptic surgery rather than antiseptic surgery.

The use of buttermilk as a food for children has been considerably discussed during the past year. Jacobson⁴ advocates its use in healthy children for whom breast milk cannot be obtained, and also for infants suffering from indigestion, gastroenteritis, or conditions of debility. Its use is favored on the ground of its acidity, the absence of fat, the presence of very fine particles of coagulated casein, and its low price. Schwartz⁵ was one of the first in this country to advocate its use. He has found it to act well after the acute stage of intestinal disorders has passed. In discussing one of his papers Koplik refers to the fact that no definite indications for its employment have been formulated. Winters characterized its use as unphysiological. If it be a proper food, then nature has erred when she put 4 per cent. of fat in human milk. Chapin thought it possible that in certain cases it might prove a suitable food, but it is certainly not adapted for universal use. La Fétra said he had tested it in the Nursery and Child's Hospital, but without very favorable results.

¹ Vratich, 1903, vol. iii., No. 7; *Archives of Pediatrics*, July, 1903.

² *Glasgow Medical Journal*, May, 1903.

³ *American Medicine*, June 6, 1903.

⁴ *Arch. de Méd. des Enf.*, February, 1903.

⁵ *Archives of Pediatrics*, April, 1903.

Some observations upon the results of infant feeding, obtained in tenements and institutions in New York, are reported by Holt and Park.¹ The quality of milk consists in the presence or absence of bacteria and chemical constituents which cause coagulation of the substances contained in the milk. The milks that were used were ordinary grocery milks, condensed milk, milk from the distributing stations, and the high-class bottled milk. Contrary to the general idea, the majority of the tenement-house children were not bottle-fed; inquiry showed that not more than two or three children in a block received their nourishment from bottles, and that in a large majority of cases some form of sterilization was practised by the mothers. It was also found, in cases which had been selected and carefully followed, that in the summer time in 68 per cent. the results were good and 32 per cent. bad. In winter the good results amounted to 93 per cent. By results "good" and "bad" were meant the outcome of feeding on these various forms of milk, ascertained at regular intervals by twelve physicians who had the supervision of the cases under observation. The Strauss milk in winter gave the best results, as it also did in the summer time. The conclusions reached by the writers are that the feeding of infants is a most complex question in tenement-houses; that it depends for good results upon cleanliness, both in the preparation of the food itself and also upon the good attention which the patient receives.

Milk: Its Production and Use as an Infant Food. It is one of the most firmly established principles of pediatric practice that cows' milk is the best substitute for breast milk. The importance of wholesome and pure milk, therefore, can hardly be overestimated, and pediatric practitioners have long been alive to this fact. The improvement in the milk-supply of cities is one of the most notable achievements of modern sanitation. This improvement is due in a large measure to the efforts of medical practitioners, and more especially to pediatric practitioners. The tendency of all modern efforts has been in the direction of prevention. The stage of accepting unclean milk and attempting to render it safe for use by sterilizing has passed. Pasteurizing, and even sterilizing, is still necessary to a large extent; because progress has not yet been sufficient to warrant its omission. Each year, however, sees decided improvement. Brown,² of Elmira, presents an extended discussion of the relative merits of sterilized milk, Pasteurized milk, and clean milk. The paper is well worthy of careful reading by those interested in the subject. The following, however, may be given as a summary of his views: Sterilization at 212° F. is of great

¹ Medical Record, May 23, 1903.

² Archives of Pediatrics, April, 1903.

value, especially in cities and to the poor who lack intelligence, because it can be performed by anyone with simple apparatus. Pasteurization at a temperature of 140° to 158° F. in closed vessels for fifteen minutes is much to be preferred, as the milk is little changed in its taste or chemical properties from raw milk, and this temperature is sufficient to kill pathogenic germs and lactic acid-producing bacteria. But we must agree with Holt that all heating of milk sufficient to kill bacteria does impair to some extent its nutritive qualities and to a degree proportionate to the height of the temperature employed and the length of time it is continued. When obtainable, fresh, pure, clean milk used raw is much to be preferred. It is now supplied to many of the large cities. There is a strong and rising demand among the laity for such milk. It can be provided to all cities and towns of even moderate size if the profession will put forth proper efforts to procure it. Under the general law all milk dealers should be licensed by the city or town in which they sell milk. Such license should give the health department the right to enter upon and inspect at any time the premises upon which milk is produced. It should also carry with it a statement on the part of the dealer that all cows producing milk which he sells have been tested for and found free from tuberculosis.

The effects of sterilization upon the phosphorus compounds have been studied by Gagoni.¹ He found that sterilization by Soxhlet's method causes no change in either the organic or inorganic phosphorus compounds, but ordinary boiling does precipitate those compounds and impairs the nutritive value of the milk. In studying the film which forms on heated milk, Rettger² concludes that the formation of film on heated milk is dependent on proteid in the milk. This proteid is caseinogen. The presence of fat facilitates film formation, but is not essential. While surface evaporation facilitates film production, it is not necessary.

An editorial article upon the bacteria found in milk adopts the classification of Conn.³ They are of three varieties: (1) those producing lactic acid fermentation; (2) those producing albuminoid decomposition; (3) those having no noticeable action on milk. The great number of those ordinarily met with belong to the first class, and are probably not pathogenic to man. It is this class which under usual conditions multiply rapidly in milk, and is most largely responsible for the high counts made when the milk is twenty-four or forty-eight hours old. The lactic acid resulting from their growth checks the growth of many other organizations in the milk, and even in the intestine of man seems to have a favorable action in a similar way. Furthermore, the

¹ Riv. di Clin. Pediat., March, 1903.

² American Journal of Physiology, July, 1903.

³ Archives of Pediatrics, January, 1903.

rapid increase in the number of the lactic acid bacteria tends to limit or check the growth of other varieties, and in this way is not an unmixed evil. The organisms of the second class are much rarer and fewer in number than the lactic acid bacteria. While themselves non-pathogenic to man, they may by their growth in milk produce substances which are detrimental or even poisonous. Their growth is ordinarily checked by the action of lactic acid. In the third class are grouped many varieties of organisms, for the most part harmless to man. Of pathogenic organisms the tubercle, typhoid, and diphtheria bacilli have been demonstrated in milk, but the question of their relation to disease is not settled. The infective agent of scarlet fever can be carried in milk, but, as its identity is unknown, it cannot enter into consideration.

Shaw,¹ of Albany, urges the importance of determining not only the fat, but also the total solids in milk used for infant feeding. He considers the various methods of milk testing, but prefers the Babcock test, which can be relied upon for accuracy, and is, at the same time, the simplest, easiest, and most economical for the general practitioner. The possibility of a child contracting aphthæ and herpes from drinking the milk of cows suffering from foot-and-mouth disease has been investigated by Brush.² The conclusion would seem to be that this is entirely possible.

Escherich not long since advanced the theory that there are ferments in milk which render it more nutritious as a food than the mere chemical analysis would show. He holds that for this reason raw milk is better than boiled milk. He found in human milk hydrolytic, proteolytic, and coagulating ferments. It is the opinion of Moro³ that these ferments, although undoubtedly found in both breast milk and cows' milk, are of no importance in the nutrition of children. Infants fed on boiled breast milk apparently thrived as well as those who were directly nursed. Klimmer,⁴ after experimenting extensively, concludes that neither breast milk nor cows' milk has any germicidal power.

A strong plea for establishing free milk stations in cities, at which milk for young infants may be obtained, is made by Deutsch.⁵ He describes what such stations should be, and lays down regulations for securing proper milk. Extended rules for regulating the production, transportation, and distribution of milk are also given by the Milk Commission of the Philadelphia Pediatric Society.⁶ The list of fifty rules formulated by the Bureau of Animal Industry of the Department of Agriculture may also be found in the same place.

¹ Archives of Pediatrics, August, 1903.

² Journal of the American Medical Association, June 20, 1903.

³ Münchener med. Wochenschrift, January 27, 1903.

⁴ Archiv f. Kinderheilkunde, 1903, xxxvi., Nos. 1, 2, 3.

⁵ Centralblatt f. Kinderheilkunde, July, 1903.

⁶ Archives of Pediatrics, October, 1903.

DISEASES OF THE ALIMENTARY TRACT.

Riga's Disease. This disease is rare in this country, but occurs not infrequently in Italy. It is occasionally seen, however, in Italian babies here. An extended paper on the subject is contributed by Amberg,¹ of Baltimore. According to the description given by Riga, in 1881, a membrane of pearly-white color appears between the apex and frænum of the tongue. It does not change its appearance, and never occurs in other parts of the mouth. It is little or not elevated over the surrounding mucosa, of round shape, very difficult to detach, and if detached there is very little bleeding. After removing the membrane the surface on which it was implanted is bared of its mucosa ; however strongly cauterized with silver nitrate, the membrane is reproduced after one or two days. It may grow to about the size of 1 cm. in diameter. There is no general or partial glossitis ; the regional lymph glands are not enlarged. If sucking is interfered with, it is only on account of the weakness of the baby, whose general state of health is bad and becomes gradually worse. The end is nearly always death. In the first days the disease may perhaps be febrile, but later it is afebrile. Gastrointestinal disturbances are nearly constantly present. The disease occurs in sucking infants a little before or at the beginning of dentition. Riga is not inclined to regard the irritation produced by the teeth as an etiological factor. The parents are nearly always well, but most of the babies present a status lymphaticus. He regards the disease as infectious, but not contagious, and the local lesion under the frænum as of internal origin.

Aphthæ and Herpes. While studying the subject of foot-and-mouth disease, E. F. Brush² found several children in Massachusetts who had evidently been poisoned by milk of cows suffering from that disease. Five children in one family were afflicted with a severe form of herpes which it seems certain was due to that cause. There is an aphthous condition of the young in both the bovine and human species that is non-contagious, and there is also an aphthous condition in both that is contagious. The similarity between the contagious and the non-contagious in both families is so marked, clinically, that it is very difficult to separate them ; in neither of the families, and in neither the contagious nor the non-contagious affections have any pathogenic organisms been discovered. In the contagious affection, contrary to the general rule, one attack does not give immunity. Therefore, the only way to diagnose in the human young a stomatitis aphthosa acquired

¹ American Journal of the Medical Sciences, August, 1903.

² Journal of the American Medical Association, June 20, 1903.

from the bovine race would be from the knowledge that the milk comes from an infected herd. All the literature points straight to one fact, namely, no matter how severe the affection may be, if it is caused by the milk it subsides very quickly without further treatment by simply stopping the milk. So it follows that the simplest way to diagnose between contagious and non-contagious aphthæ in the milk-fed young is to stop the milk. Then, if the milk was the cause, the diagnosis is made and the affection cured.

Retropharyngeal Adenitis and Abscess. In a paper on this subject Morse¹ asserts that primary abscess is most common between four months and one year. It is due to suppurative of the retropharyngeal lymph nodes. The infection of these nodes usually results from some disease of the cavities which they drain, especially the nasopharynx and middle ear. The nodes usually atrophy after the third year; hence the infrequency of the disease after that age. Among the symptoms are difficulty in swallowing, changes in the voice, and obstructed respiration. The head is usually extended and turned to one side. Mistakes are often due to failure to consider the possibility of retropharyngeal abscess. Palpation should be used as well as inspection. Only a tongue depressor should be used, as death has been known to result from the use of a gag. The prognosis depends chiefly on treatment, for untreated cases rarely recover. Morse believes in the internal incision, and does not approve of the incision through the neck. If a child is placed in the upright position and is tipped forward the instant the incision is made the pus will not enter the trachea. Under such treatment the mortality is about 5 per cent. An unusual case of retropharyngeal adenitis is reported by J. J. Potter.² The course of the disease was exceedingly slow, as four months intervened before the formation of the abscess. During this time extreme malnutrition developed.

Recurrent Vomiting. The condition sometimes known as periodic or cyclic vomiting has received considerable attention from medical writers during recent years. Several theories have been proposed to account for its occurrence, but it must be said that its cause is still undetermined. The two most common theories are that it is a manifestation of the uric acid diathesis, or is a neurosis. According to Edsall³ the former has no better basis than the fact that the subjects of the disorder are often members of gouty families, while the latter gives us no understanding of the condition nor aid in relieving it. He reports several cases which show that at the time of the attacks, but not in

¹ Journal of the American Medical Association, July 31, 1903.

² Archives of Pediatrics, April, 1903.

³ American Journal of the Medical Sciences, April, 1903.

the interval, there is a severe acid intoxication of the type seen in diabetes mellitus. Treatment directed toward the acid intoxication was strikingly successful. This consisted in the administration of large doses of bicarbonate of soda at the first symptoms. In several cases in which acetone and diacetic acid appeared in the urine the attack was apparently cut short by large doses of the alkali. Edsall believes that if the alkaline treatment is to be used at all, some readily diffusible alkali, such as sodium bicarbonate or citrate, should be chosen, and extremely large doses should be given as soon as the first suggestion of an attack is observed; 100 grains, given as rapidly as possible, is probably a low limit. It is best to keep up the rapid administration of large doses until the urine is decidedly alkaline, and then keep the urine alkaline until the symptoms have disappeared. Frequent moderately large doses would be better than the occasional use of extremely large doses. During the interval one should give enough alkali to keep the urine about neutral. Edsall is not willing to assert that the attacks that we call recurrent vomiting are always dependent upon the same primary disorder. It will, however, be an easy matter to determine in how many cases this form of intoxication is present, and how frequently flooding the organs with alkalies will prove to be an effectual treatment.

Delcourt¹ asserts that the three prominent symptoms of this affection are: sudden onset without an appreciable cause, and the sudden termination of the symptom; the uncontrollable vomiting; reappearance of these symptoms at irregular intervals. The headache, the plaintive cries of the child, the position it assumes in its bed, the repeated vomiting make one think of tuberculous meningitis, but in psychic vomiting the latter is easier and in spurts, the abdomen is generally retracted and not painful, the pupillary phenomena are not interfered with, and the pulse rate differs. In doubtful cases Kernig's sign and lumbar puncture may be resorted to. During the attack the patient should have no food, but may be given sugar-water. Two or three times a day a large amount of physiological salt solution should be injected per rectum. This is done after the bowels have been thoroughly cleaned by a previous enema. After the attack the child should be given milk diluted with Vichy water, cereals, etc. The diet later should consist of milk, eggs, and a little white meat, together with all the vegetables except tomatoes and sorrel. In other words, the diet should be simple. Fruits are allowed, and lime-water may be given as a drink. Hygienic measures and salines to keep the bowels freely open are recommended.

¹ Journ. Med. de Brux, 1903; American Medicine, August 8, 1903.

E. L. Pierson¹ also reports several cases in which acetone and diacetic acid were present in the urine just before or during the early stages of the attack. He believes that attacks were mitigated in some cases and in others unquestionably prevented by large doses of bicarbonate of soda. He gave as high as 125 grains in twenty-four hours. Cases of cyclic vomiting are reported by Ely,² in which a toxin allied to the uric acid series was found in the urine. He insists on the importance in severe cases of hypodermic injections of morphine and atropine accompanied by high saline enemata.

Dilatation of the Stomach. A rather unusual case of dilatation of the stomach is reported by Guthrie,³ who believed the condition to be due to pyloric obstruction. The symptoms began when the child was six weeks old, with obstinate constipation and incessant vomiting, which latter had now ceased. The stomach was greatly enlarged, its lower margin extending two inches below the umbilicus, and it held fourteen ounces of fluid without causing sickness. Peristaltic waves passed across the epigastrium from left to right. The symptoms had been temporarily relieved by lavage, but it was thought necessary to resort to an operation to obtain permanent benefit.

Pyloric Stenosis. This condition has before been considered in these pages at considerable length.⁴ But little has been added to our knowledge regarding it during the past year. One of the best of recent papers is that of Cantley and Dent,⁵ who report seven cases. They believe that congenital hypertrophic stenosis of the pylorus is probably far more frequent than is supposed; that the condition is still not generally recognized, for the symptoms may easily be misinterpreted or overlooked; that the affection may be successfully treated by pyloroplasty. In seven cases under the author's observation the most striking clinical features were steady loss of weight, dilatation of the stomach, irregular temperature from the toxæmia dependent on constipation, visible gastric peristalsis, and occasionally pyloric tumor. Another extended article is that of Moynihan, of Leeds,⁶ who reviews the literature and considers especially the symptoms, morbid anatomy, and methods of operation. Cases have been reported and papers written upon this subject by F. W. Shaw,⁷ H. Beardsley,⁸ H. W. Gardner,⁹ Cariot,¹⁰ and J. Park West.¹¹

¹ Archives of Pediatrics, July, 1903.

² Journal of the American Medical Association, March 28, 1903.

³ Archives of Pediatrics, January, 1903.

⁴ PROGRESSIVE MEDICINE, March, 1903.

⁵ Lancet, December 20, 1902.

⁷ Brooklyn Medical Journal, May, 1903.

⁹ Lancet, January 10, 1903.

¹¹ Archives of Pediatrics, October, 1903.

⁶ Medical News, October 24, 1903.

⁸ Archives of Pediatrics, May, 1903.

¹⁰ Gazette des Mal. Inf., Feb. 12, 1903.

Abscess of the Liver. This is a rare disease in young children, but its occurrence in a child aged two and one-half years is reported by Arnoit.¹ Following an attack of dysentery there were fever, fulness of the abdomen, and evidence of enlargement of the liver. Twelve ounces of pus were evacuated through a cannula inserted in the tenth intercostal space in the anterior axillary line. Improvement followed, and the child seemed to be on the road to recovery, when tuberculous meningitis developed, and the child died.

The Diarrhoeas of Infancy. In few other diseases has the death rate been so largely reduced during the past decade as in the diarrhoeal diseases of infancy. In the old city of New York deaths from this cause in 1892 numbered² 4119, a ratio of 24.10 per 10,000 population; in 1902 such deaths numbered 2936, a ratio of 13.72—a reduction of more than 40 per cent. In the opinion of the health authorities the gradual reduction of this ratio is attributable to a number of causes, including such as a better understanding on the part of mothers and nurses of the necessity of care and cleanliness in the feeding of infants, a better milk supply, cleaner streets, the providing of Pasteurized and sterilized milk through philanthropic agencies, and, finally, the establishment of small parks. In a recent study of this subject R. G. Freeman reached the conclusion that the improvement in this respect, which he found had prevailed to a greater or less extent through the country, was in all probability due to the general practice of sterilization or Pasteurization of milk, as this was the one change in which all sections participated.

The bacteriology of the summer diarrhoeas of children has been a subject of renewed interest during the past year or two. Until very recently the opinion was quite generally held that these diarrhoeal conditions were not due to a single bacterial cause. Several microorganisms were believed to be capable of producing them. Then came the discovery of the Shiga bacillus as a cause of epidemics of dysentery in Japan and the Philippines. In the summer of 1902³ two of Flexner's pupils working in the Wilson Sanitarium for Children near Baltimore, not only found the bacillus in almost all of fifty cases of diarrhoeal disease with mucus and blood in the stools, but demonstrated an agglutinative reaction with the blood serum of the patients. Since the delivery of Flexner's address Park has found the bacillus in a considerable percentage of cases of dysentery in both adults and children occurring in local outbreaks in the vicinity of New York. It has been found by other investigators in isolated cases in the hospitals of New

¹ British Medical Journal, January 4, 1903.

² Archives of Pediatrics, July, 1903.

³ Archives of Pediatrics, February, 1903.

York. Flexner held out the hope that in the Shiga bacillus we would find the etiological factor in a large part of the summer diarrhoeas of children, and that it might be possible to develop a serum which would be of service in treatment. It was his expectation that the bacillus would be found as the cause of intestinal lesions of various anatomical types, just as the diphtheria bacillus is the cause of various lesions in the throat, and that there would thus result a marked simplification of the classification of diarrhoeal diseases of children, the problem which has so long vexed all concerned with it. This hope was destined to be disappointed, temporarily at least. Subsequent investigations have introduced elements of confusion into the problem of the bacteriology of the diarrhoeal diseases of children. Park, Dunham, and Carey,¹ after an extended study of the various forms of the dysenteric and diarrhoeal diseases in New York and vicinity, were not able to find the dysenteric bacilli or obtain in children a marked serum reaction in summer diarrhoea where no dysenteric symptoms appeared in the case examined or in other cases in the house or neighborhood.

Wollstein² reports an extended bacteriological study of 114 cases of dysentery in young children. Thorough examination of the stools was made to determine the presence or absence of the bacillus dysenteriae of Flexner. Cultural reactions and the agglutination test determined the presence of the bacillus in 34 per cent. of the cases. The majority of these cases were only one year of age, and 74 per cent. were fatal. In many of the cases blood in small amounts was present, and mucus in all cases was passed in large amounts in the stools. The stools varied in frequency from two to nine, and were in most cases green in color. The temperature ranged from 98° to 103° F. The fatal cases terminated in from three days to six weeks, the greater number dying early in the second week. The serum reaction is uncertain during the first week, frequently positive after the sixth day, but may be absent for the first two weeks. It cannot be relied upon for early diagnostic purposes in infants and young children. The isolation of the bacillus dysenteriae is the only positive evidence of infection during life, and it may be found in the stools for a period of two or three weeks or longer. The bacillus corresponded very closely to that described by Shiga.

The most authoritative statements on the bacteriology of diarrhoea are, perhaps, those made in May in a discussion participated in by Flexner,³ Park, Koplik, Holt, Knox, and Booker. The status of the subject at that time may be best given in the words of Flexner: "Everything is left to the future; we have simply made a start. We have estab-

¹ Medical Review of Reviews, July, 1903.

² Journal of Medical Research, August, 1903.

³ Archives of Pediatrics, November, 1903.

lished the presence in these diarrhoeal diseases of an organism which previously has not been discovered in them. We have evidence of its pathogenic action. It is the future which must determine what position this organism must occupy with reference to the etiology of the summer diarrhoeas."

The bacteriology of the diarrhoeas of children requires much additional study, and this it is now receiving. Positive statements at the present writing are impossible. It seems to be a fact, however, that the Shiga bacillus is found in most of the cases when mucus and blood are present in considerable amounts, and is not universally present in the cases which do not present this dysenteric type.

PREVENTION. It is becoming more and more clear each year that the summer diarrhoeas of children are preventable. The statistics quoted in the previous pages are evidence of this fact. Two factors are very important in the prevention of these diseases: (a) proper diet; (b) early and prompt treatment of the first symptoms. The importance of suitable diet in preventing these diseases is especially urged by Cotton.¹ In view of our knowledge of the summer diarrhoeas, the question of feeding, he believes, is of paramount importance in prevention. Kerley² also writes strongly upon the influence of good food in preventing summer diarrhoea in children. He asserts most positively that the large mortality from this disease in cities will be done away with when the infants of the poor receive what they are entitled to—clean, suitably prepared, properly cared for, and properly administered food. This means clean fresh milk with ice to keep it, and it means that the mother must be individually instructed by a visiting physician or nurse how to keep and prepare the food. The dangers of carelessness in its preparation must be pointed out to her, and what to do in the beginning of illness in the baby must be made very plain. Mr. Nathan Strauss, in his most estimable charity, has demonstrated that it is practical to supply the poor with a safe milk. In proof of the theory that diarrhoea can be prevented by proper feeding, Kerley refers to an experiment tried in New York under the supervision of Dr. W. H. Park in the summer of 1902. Fifty tenement children under one year of age were selected. They were fed on the Strauss milk, and were visited two or three times a week by a physician whose duty it was to look after them; the mothers were carefully instructed as to the care of the food and feeding apparatus; with the first sign of illness the physician in charge was to be notified. Among these fifty tenement children, all under one year of age, all bottle fed, selected at random, there was not

¹ Journal of the American Medical Association, June 30, 1903.

² New York Medical Journal, November 22, 1903.

one death. This valuable observation bears out the contention that the deaths from summer diarrhœa among tenement children may be greatly reduced by the use of good milk given under proper supervision, supplemented by prompt medical care upon the first sign of illness.

Perhaps in 1 per cent. of the cases of summer diarrhœa a very severe direct infection is evident, and the condition of the patient is grave from the very first; in the remainder the invasion is gradual and, if the warnings given are heeded, the illness usually will quickly terminate in recovery. The golden rule in the prevention of summer diarrhœa is the one I quoted last year, "Stop the beginnings." Preventive measures cannot be stated in better language than that used by the Health Department of New York in a pamphlet on the care of infants during the summer, intended for distribution among the tenement population during the summer. This advice is as follows: "When the baby has loose green stools it means that the baby is sick and needs medical attention. The disease is frequently mild at the beginning. The baby has no fever, and shows no signs of illness other than the diarrhœa. Such a baby oftentimes in a few hours becomes seriously, if not fatally, ill. The simplest case of vomiting and diarrhœa during the summer must never be neglected. A baby sick in this way should be given two teaspoonfuls of castor oil. Stop the milk at once. Give barley-water or rice-water diet until the child can be taken to the family physician or to a dispensary."

TREATMENT. I devoted so much space to this subject last year,¹ as well as the year before, that extended consideration does not now seem necessary. This is farther true, as very little that is new has recently been offered on the subject. A brief summary of an especially good paper by Kerley² is, perhaps, all that is required. A change of diet is the first and most important measure. In some cases an abstinence from milk for a few days is all that is required, but usually a week or two must elapse. Occasionally a child is found who cannot resume a milk diet until cold weather. After trying various substitutes for milk Kerley is positive in the belief that a carbohydrate in the form of gruel is best. He uses gruels of barley or rice, either plain or dextrinized. They are often flavored with a beef or mutton broth, and are given in the same amount the child received of milk. It must be said that this cereal gruel feeding is becoming the recognized dietetic management in the summer diseases. Castor oil or calomel are given at the outset, but such drugs as salol, resorcin, and other antiseptics are not used. Bismuth subnitrate is more generally approved than any other drug.

¹ PROGRESSIVE MEDICINE, March, 1903, p. 237.

² New York Medical Journal, June 6, 1903.

It may be given in from ten to twenty-grain doses every hour. Opium is used when there is tenesmus and straining, which usually means small frequent stools. It is also of use when there are many large watery stools. Irrigation of the colon is indicated in cases of high temperature and an inactive bowel. Normal salt solution as cold as 70° F. in the high fever cases, and as hot as 110° F. in those with low temperature and extreme prostration, produces good results. For fever, sponging with equal parts of alcohol and water at 80° F. is better than using packs. In very acute severe cases, with frequent vomiting, many large watery stools, and marked prostration, morphine hypodermically, one-thirtieth or one-sixtieth of a grain, guarded by atropine, reduces shock. The only measures of value in vomiting are diet, stomach washing, gavage, or forced feeding.

The only new feature of consequence in the treatment of these diseases proposed during the last year was the Shiga serum. At the present time no positive statements can be made regarding its efficacy. Although it was used to a considerable extent during the past summer, no extended reports as to its effect are available at the present writing. It is certain that but little is to be expected from it in the cases in which blood and mucus do not appear in the stools. In cases of the dysenteric type there is reason to anticipate a bright future for the serum.

Among the numerous articles on summer diarrhoea and its treatment may be especially mentioned those of Morse,¹ Nicoll² (an extended and admirable paper); Visanska,³ Hicks,⁴ and a series of articles by Rucker,⁵ Patton, Landry, Gilbert, and Everleth.

Intussusception. Although this condition is comparatively rare in practice, it receives considerable attention each year in medical literature. Cases being of rather uncommon occurrence are apt to be reported. A very good paper by Huber describes two cases and enters into the question of diagnosis. The younger the child the more distinctive are the symptoms and the earlier they appear. Huber believes that paroxysmal colicky attacks in connection with rigidity of the abdominal recti and localized pains form a characteristic symptom-complex. Appendicitis in children is frequently attended with pain in the umbilical region and rigidity of a rectus muscle. The pain, however, is of a different character, not necessarily paroxysmal. As a rule, there is but little difficulty in arriving at a diagnosis.

¹ American Medicine, May 2, 1903.

² International Clinics, vol. ii., Thirteenth Series.

³ Therapeutic Gazette, July 15, 1903.

⁴ Lancet, August 15, 1903.

⁵ New York Medical Journal, August 22 and 29, 1903.

TREATMENT. Most authorities seem at present inclined to favor moderate attempts at reduction by means of fluid injections. These failing after a few attempts, prompt laparotomy should be done. A few surgeons advise laparotomy at once, and disapprove of all injections. This cannot be said to be the most common teaching, though all competent authorities disapprove of prolonged or harsh attempts at reduction. Rigby¹ saw a group of seven cases of intussusception, and from his experience in these cases concludes that immediate laparotomy should be insisted upon without delay. No valuable time should be lost in attempting inflation of air or injection of fluids by rectum. The keynote of operative success is rapidity. In favorable conditions, as in hospitals, and with skilled assistants, the mortality of reducible intussusception should be diminished to a very small percentage. The chief points in the after-treatment are early feeding and the use of opium when necessary. Erdman² reports three cases of successful operation for intussusception, completing his series of twenty-two cases. Riddell³ reports three cases developing in children of the same family during the first year of life, two being relieved by operation. D'Arcy Power⁴ reports an intussusception spontaneously cured as demonstrated by an exploratory incision. Rutherford⁵ reports a successful operation in a child of three months, and Chiene⁶ one in a child of four and one-half months.

Appendicitis. The literature on appendicitis in childhood was extremely meagre during the year. Mitchell reports a case of tonsillitis, quickly followed by appendicitis, nephritis, and pyelitis. These, all plainly of a septic origin, could hardly be otherwise explained than by a generalized infection. Whether this general infection was from absorption from the appendix, or whether the infections of the appendix and the blood were both from a common source, such as the tonsils, are questions which we are not, in the present state of knowledge, able to answer positively. In this case the probabilities are many in favor of the latter view. More light on this subject is greatly to be desired, and the case is reported as having some bearing on the question from the clinical side. Erdman⁷ reports two cases of appendicitis in which the appendix was found to contain numerous pin worms.

Peritonitis. Tuberculous peritonitis is not uncommon in early life. It is always a grave condition and of especial interest because of the marked results which are obtained in many cases by comparatively

¹ *Lancet*, February, 7, 1903.

² *Archives of Pediatrics*, June, 1903.

³ *British Medical Journal*, January 10, 1903.

⁴ *Ibid.*, April 25, 1903.

⁵ *Glasgow Medical Journal*, June, 1903.

⁶ *Scottish Medical Journal*, January, 1903.

⁷ *Archives of Pediatrics*, June, 1903.

simple operative procedure. In an admirable article Rotch¹ considers the disease with reference to its treatment by laparotomy. From a pathological standpoint he divides the disease into three forms: 1. A miliary tuberculosis with acites, acute or subacute in its course. 2. A fibrous form, in which ascites may be but is not usually present. This second form is essentially chronic, and is represented by the formation of a fibrous tissue, with matting of the intestine, the omentum, and the mesentery, without much tendency to caseation or to breaking down. 3. A later stage of the form just described, in which there occur large tuberculous deposits, with caseation and softening. This form has by some pathologists been called ulcerative, and in it the lungs are commonly affected. It is not so chronic as the fibrous form, but is characterized by more fever and more severe symptoms.

In view of the difficulty of determining clinically the various types just enumerated we must consider certain questions: 1. The diagnosis of the presence of tuberculosis of the peritoneum. 2. The detection of which pathological form is present. 3. Whether the tuberculosis is localized and is not complicated by tuberculosis elsewhere, or is secondary to tuberculosis of the thoracic cavity. 4. Which of these forms of tuberculosis of the peritoneum are amenable to treatment? 5. Under what circumstances and in what cases should laparotomy be performed?

The answer to these questions must be, Rotch asserts, somewhat uncertain. It is only in a general way with our present knowledge that we can determine clinically whether a laparotomy should be performed. The symptoms in infancy and early childhood of tuberculosis of the peritoneum are so varied, unsatisfactory, and obscure that it is of great importance, first, to determine whether the case is tuberculous or not, and, next, whether the case is tuberculosis of the peritoneum, lung, lymph nodes, or any other part of the economy. In many cases the physical examination fails to give us this knowledge, and if the temperature is irregular and much raised it will often be impossible to determine this question decisively. If, however, the temperature is moderate, 99° to 101° F., and keeps fairly regular within these bounds, we can with decided benefit use the tuberculin test. Although it can not at present be said that a tuberculin reaction will take place in every case of tuberculosis in infants and children, yet it is of value when it occurs, although its negative evidence is not decisive.

After having made ourselves perfectly sure that tuberculosis is present, it should be next decided, if possible, whether the tuberculosis exists elsewhere than in the abdominal cavity. This in early life is often exceedingly difficult, as there may be a tuberculous process in the thoracic cavity, either of the bronchial lymph nodes or the lung itself,

¹ Journal of the American Medical Association, January 10, 1903.

without physical evidence, the sputum in these cases being often impossible to obtain. A swab, however, for culture should be taken from the œsophagus, and will, in some cases, reveal the presence of the tubercle bacillus which otherwise would not have been detected. The examination of the blood in reference to leukocytosis is of very little diagnostic value, as leukocytosis may or may not be present.

Given, then, the opinion in a special case that tuberculosis of the peritoneum is present, we first consider the age in considering whether laparotomy should be performed. If the patient is under one year, although as a last resort, we may operate, it does not have the same favorable prognostic significance as at a later period. Moreover, we can expect more favorable results from laparotomy when ascites is present, as the presence of ascites usually shows a less advanced and more active process than when it is not present, as is often the case in the fibrous form, which has been stated to have a less favorable prognosis. If by means of physical examination we have made up our minds that we probably have a localized fibrous form to deal with, the opinion being based on the detection of masses large and small in the abdomen, without evidence of fluid, even then it is better to operate than to run the risk of the child dying of exhaustion, provided we find no evidence that tuberculosis exists outside the abdominal cavity. In the third or so-called ulcerative tuberculosis of the peritoneum it is usually evident on physical examination that there is tuberculosis elsewhere than in the abdominal cavity, the probability being that it is in the bronchial lymph nodes or lungs, and that the tuberculous peritonitis in this instance is secondary to a thoracic tuberculosis and, therefore, as a rule, cannot be benefited by laparotomy. The primary forms, on the other hand, had much better always be operated on, even when the affection is secondary to tuberculous mesenteric lymph nodes, for the removal of such nodes or node is indicated, and in such cases there is a fair chance for a radical cure of the general tuberculous infection of the peritoneum.

Sutherland,¹ of London, also presents a study of tuberculous peritonitis, considering chiefly prognosis. He believes that in uncomplicated tuberculous peritonitis the prognosis is good. When tuberculous pleurisy is present the prognosis is still favorable. The prognosis is rendered less favorable in the case of (a) a strong family history of tuberculosis ; (b) an infancy passed under bad hygienic and dietetic conditions ; (c) a constitution of feeble resistant power, or (d) a history of severe infective illness in early life. The prognosis is rendered less favorable in the presence of one or more of the following symptoms :

¹ Archives of Pediatrics, February, 1903.

Continuous pyrexia, rapid wasting, persistent diarrhœa, rapid pulse, or recurrent acute exacerbations. The prognosis is rendered less favorable in the presence of one or more of the following local complications: tuberculous ulceration of the bowel; extensive caseation of the mesenteric lymph nodes or of tuberculous masses; localized suppuration from infection from lymph nodes or the intestine; obstructive symptoms from bands or matting of the intestine. The prognosis is bad in the presence of the following complications: the rupture of a suppurating lymph node or the perforation of an intestinal ulcer into the peritoneal cavity; pulmonary tuberculosis; tuberculous meningitis; general miliary tuberculosis. In tuberculous peritonitis the prognosis is not appreciably affected by simple laparotomy.

The treatment and general management of tuberculous peritonitis is considered by Guthrie.¹ Arsenic is the only medicinal preparation, he believes, which may have any effect upon the disease itself. The medicinal treatment is almost entirely symptomatic. Schramm² also considers the subject of treatment. It is his experience that the prognosis is best in the exudative form. Spontaneous recovery, though possible, is rare. In the ulcerative type with pus, though often severe, permanent recovery sometimes follows operation. In the type marked by adhesions and infiltrations the prognosis is very bad.

DISEASES OF THE RESPIRATORY TRACT.

Tonsils. The influence of enlarged tonsils upon the physical and mental development of children is the subject of investigation by Wilbert.³ He made observations upon the tonsils of 375 school-boys, and found them enlarged in 62 per cent. The most decided enlargement as well as the most marked symptoms occurred between the sixth and ninth years. The percentages were much lower after the end of the ninth year. The author also shows that the children that progressed poorly in school were in over three-fourths of the instances those with enlargement of the tonsils. On the treatment of rheumatic tonsils in children Stewart⁴ believes that calomel and a saline should be the first remedy to be used. Salicylate of soda acts as a specific when given internally in small doses of about three grains every two hours. This, if given from the onset, will often prevent suppuration, shorten the attacks, and relieve the pain and swelling. He uses a 25 per cent. of hydrogen peroxide as a swab, but does not use tincture of iron until

¹ Archives of Pediatrics, April, 1903.

² Allg. Wien. med. Zeit., April, 14, 1903.

³ Deutsche med. Wochenschrift, February 5, 1903.

⁴ Medical News, May 23, 1903.

late in the disease, and then only for the purpose of contracting the relaxed tissues.

Adenoid Growths. It has been the common impression that adenoid growths are always acquired, and they are not supposed to be found in young infants. Cases, however, have been reported in recent years in which the adenoid operation seemed to be required by newborn infants, and was actually performed. Baginsky¹ asserts that adenoids are sometimes congenital. They are certainly found in very young children in whom it is impossible to explain their presence as the result of catarrh. Dun² also says that they are sometimes present at birth. In many cases they are slight and require no interference. In a few instances, however, severe and even grave symptoms may be present. These will materially interfere with the health of the infant, and do not tend to improve with ordinary medical treatment. There are several forms of the affection: the first, in which are found marked nasal obstruction and catarrh, with or without epistaxis; the second, in which reflex phenomena are the principal manifestations of the trouble, without any real nasal obstruction; the third, those in which secondary septic affections predominate, these being chiefly septic adenitis and otitis media; and last, those cases in which nasal obstruction is present and is associated with nervous and septic conditions.

The relation of adenoids to enlarged tonsils, croup, catarrh, and other conditions is considered by Harland.³ He refers to the well-known fact that the diseased conditions which result from adenoids do not always disappear as the adenoids shrivel away. He lays down the rule that adenoids should be removed in young children if there is enlargement of the faucial tonsils, if there are attacks of croup, and if the child has frequent colds, sore throat, or gives other evidence of throat infection or of nasal obstruction. He believes that mouth breathing is always an indication for operation. By excising these growths not only do we save children from immediate drains on their vitality, but also, perhaps, from serious infection later in life. The operation is a simple and a safe one. If performed under ether no pain is felt either during the operation or afterward, and a growth is removed that is of no value to the economy. Practically, it is found that faucial tonsils do not have the same tendency to grow again after removal if the adenoids are removed also; further, the removal of adenoids in cases of spasmodic croup often markedly diminish the severity and frequency of the attacks; and, lastly, after the adenoid operation there is nearly always an improvement in the general health of the patient that is most gratifying not only to the physician but to the relatives of the

¹ Archives of Pediatrics, January, 1903.

² Lancet, August 15, 1903.

³ Therapeutic Gazette, September, 1903.

patient. As the pathological changes in the throat and in the rest of the body that result from adenoids are invariably of a kind that is hard to cure, the removal of the adenoids becomes a prophylactic measure of great importance.

As to the operation itself, Richards¹ strongly condemns removal of the adenoids without an anæsthetic, as is done in some foreign countries. The operation is thus not done thoroughly, and the examination is not likely to be made to discover unremoved portions of the growth. Recurrence is liable to follow. The use of nitrous oxide as it is employed in England gives excellent results. This method for clinic work seems almost ideal, as it is accompanied by an almost insignificant loss of blood as compared with an ether operation, and is rapid and painless. The use of the steel finger-nail as a curette is strongly condemned. Ether is the most satisfactory anæsthetic. A sharp instrument which will cut away the tissue and leave a smooth cavity is desired. Examine thoroughly to be sure the growth has been removed entirely, and keep the child in bed for a day or two after the operation.

The influence of catarrhal diseases of the throat and nose in producing *speech defects* is the subject of a very interesting paper by Hudson-Makuen.² It is generally during the second and third years that these catarrhal affections do the damage. It is then that the faculty of speech is being acquired, and at the same time even the slightest deviation from the normal condition, whether it be in the nasal, pharyngeal, or oral cavity, may be responsible for grave defects of speech. The nervous organisms of children who are subject to catarrhal affections are so delicately constructed that they cannot overcome even slight obstacles in the way of speech development. Next in importance to life itself comes the integrity of the faculty of speech, for upon it depends to a great extent the development of the higher intellectual faculties of the brain. In the treatment of these affections, moreover, it is not enough to correct structural irregularities and to remove the hypertrophied glands, but it is necessary, both by general and local medication, to remove inflammatory processes and exudations wherever found in the region of the organs of speech.

Pneumonia. It is a common belief among physicians that *croupous pneumonia* is a rare disease among infants. It is, without doubt, more frequent than the teaching of text-books would lead one to believe. Pierson³ asserts that croupous pneumonia is more common during infancy than any other age. He brings statistics to prove his theory, but they are not wholly convincing, for the observations were largely

¹ Journal of the American Medical Association, February 7, 1903.

² International Medical Magazine, February, 1903.

³ Lancet, June 27, 1903.

clinical. It is probable that some of these cases were of the intermediate type which I described last year.¹ The same author² gives the differential diagnosis between croupous and catarrhal pneumonia in children. Many of the points of difference as given by him, it seems to me, are open to doubt. The differential diagnosis between the two types in babies is extremely difficult. This is true not only of the clinical symptoms, but applies, also, even to the post-mortem examination. Holt asserts that even after a microscopic examination there is sometimes doubt as to which group a case belongs. Reviere³ also asserts that croupous pneumonia occurs in infants below two years of age as frequently as, and probably more frequently than, in older children. In infancy a diagnosis between croupous and bronchopneumonia with lobar consolidation is often impossible, many cases of bronchopneumonia with lobar consolidation appearing in the post-mortem room with a diagnosis of croupous pneumonia. On account of this difficulty, statistics based on diagnosis alone are quite untrustworthy; but this difficulty can be largely eliminated by studying autopsy cases. The mortality in croupous pneumonia is largest in the first years of life (25 per cent.); is considerable below the age of two years (15.4 per cent.), but for children above that age is comparatively small (2.3 per cent.).

Some rather interesting observations on the temperature-curve of croupous pneumonia are made by Jennings.⁴ He presents charts which illustrate a sharp remission in temperature in the first two or three days. In cases with tardy development of physical signs this is a very confusing element in diagnosis. One may be misled by this unexpected drop and have the attention directed away from the lungs. The recognized typical curve of croupous pneumonia shows a sharp rise at the onset of the disease, and but slight variation in the curve until the crisis.

Nobecourt⁵ reports thirty-one cases of *lumbar puncture* in *bronchopneumonia* of children. Seven of these showed no meningeal symptoms, twenty-four giving symptoms ranging from simple stiffness of the neck to generalized convulsions; 5 to 10 c.c. of fluid were drawn in the first seven cases. This fluid was clear, contained albumen in some cases, but ordinarily contained no cellular elements. Pneumococci were found in but two cases. Griffith⁶ calls attention to the fact that pneumonia and pleurisy in early life not infrequently simulate appen-

¹ PROGRESSIVE MEDICINE, March, 1903, p. 244.

² Practitioner, April, 1903.

³ Lancet, July 18, 1903.

⁴ Archives of Pediatrics, April, 1903.

⁵ Rev. Mens. des Malad. de l'Enf., April, 1903.

⁶ Journal of the American Medical Association, August 29, 1903.

dicoitis, for when the disease is located in the lower part of the thorax the pain is frequently reflected downward. This, together with the vomiting and fever which frequently occurs at the outset, may easily mislead the unwary.

TREATMENT. I gave last year¹ extended consideration to the subject of the treatment of pneumonia. As the literature of the past year is largely in accord with that of recent years, but little need now be said upon the subject. An article by Kerley² coincides very closely in the advice formulated last year. He lays especial stress on the fact that catarrhal pneumonia demands the best attention we can give it, not only on account of the delicate organ attacked, enclosed in weak thoracic walls, but because, unlike lobar pneumonia, scarlet fever, typhoid, and many other diseases of early life, there is no self-limitation, no cycle. In these diseases we are only required to assist the patient through the various stages; in catarrhal pneumonia we must do more—here we are asked to cure. It must be our effort to preserve every strength unit which the child possesses. An immense amount of vitality is wasted in sick children because of irritability, restlessness, and loss of sleep. One of the first duties is not to give this or that drug, or use this or that local application, but to make the child comfortable—to put it in the best condition to withstand disease. We must establish a sick-room régime which will make this possible. While it is very important to maintain the nutrition of the child, the milk mixtures or other diet should be reduced in strength, for the digestive power is largely diminished. The common error of disturbing the pneumonia patient too frequently is pointed out by Kerley. It cannot be doubted that many children are worn out by overzealousness in administering treatment. Among the distinctly medical measures, aside from those administered internally, steam inhalations with creosote deserve an important place. The patient is placed in its crib, which is covered and draped with a sheet so as to make a fairly tight enclosed place. The apparatus necessary is an ordinary croup kettle. Ten drops of creosote are added to one quart of water and placed in the kettle. The nozzle of the kettle is introduced between the sheets at a safe distance from the child's face and hands, the steaming being carried on thirty minutes every three hours. The sheets should be parted slightly about every ten minutes so as to allow a renewal of the air. The inhalations are to be given both sleeping and waking. As the patient improves the inhalations may be given less frequently until normal respiration and the chest signs tell us it is no longer required.

¹ *PROGRESSIVE MEDICINE*, March, 1903, p. 246.

² *Journal of the American Medical Association*, June 10, 1903.

Steam inhalations in bronchitis and in catarrhal pneumonia are so well thought of by Holt that he had built in the new Babies' Hospital a special steaming room. The mustard paste is another valuable remedy in the treatment of pneumonia, and is advised by Kerley. A paste of mustard and flour that will cover a large area is applied several times a day. It should be made of one part mustard to from five to ten of flour, and should be left only long enough to redden the skin. In catarrhal pneumonia the administration of drugs is of secondary consideration. We first make the child comfortable, place it under proper diet and hygienic rules of living, use local applications, steaming, and means other than the use of internal medication when possible. When drugs are given they should, without compromising their efficacy, be made as innocent as possible.

Empyema. Empyema in children is almost invariably associated with pneumonia. According to Blaker,¹ an empyema almost always begins as pneumonia, and is rarely a simple affection. As a rule, the fluid withdrawn from the chest is teeming with pneumococci. In the secondary cases, the prognosis of which is much better, there is no lung consolidation, and the patient has empyema pure and simple. Pneumococci were found in 65 out of 69 cases. Tubercle is a rare cause of empyema in children; it was found in 3 out of 23 autopsies. As stated before, the younger the patient the less the chance of recovery. A mixed infection due to pneumococci and streptococci is a bad omen. All the cases reported by Blaker were treated by opening the pleural cavity and draining it. Rib resection was done in 52 cases, and simple incision in 26. Of these latter, 12 patients recovered and 14 died.

An excellent contribution to the bacteriology of empyema is made by Bythell.² Forty cases were studied, and the following bacteria were found: streptococcus alone, 2 cases; streptococcus and staphylococcus, 1; streptococcus and pneumococcus, 1; pneumococcus alone, 26 (65 per cent.); other mixed pneumococcic cases, 9 (22.5 per cent.); and Friedlaender's bacillus and staphylococcus, 1. The writer concludes that empyema is common in children at all ages, and is decidedly more frequent in boys than in girls. The pleura is affected in the great majority of cases by a process of direct invasion from a pulmonary lesion; the latter is usually a catarrhal pneumonia in children. In many cases which are apparently "primary" the source of infection is probably also an undiscovered patch of bronchopneumonia. The micro-organism which is by far the most frequently present in the empyema of children is the pneumococcus. The clinical results of empyema depend to some extent upon the species of bacteria found

¹ British Medical Journal, May 23, 1903.

² Medical Chronicle, November, 1902.

within the pleura, the pneumococcic cases being, on the whole, the mildest. The bacteriological examination of the pus gives other indications as to the prognosis which appear to be of considerable value : (a) a small number of poorly stained micro-organisms which give feeble cultures usually denote a good prognosis ; (b) the reverse condition is not so frequently accompanied by severe clinical symptoms, especially when phagocytosis is well marked ; (c) vigorous cultures are not in themselves a reliable sign of pathogenic activity. The bronchial nodes are probably invaded by micro-organisms from the pleural cavity in every case of empyema. The organisms are sometimes also found after death in the mesenteric nodes. With the exception of those cases in which there are tuberculous lesions of the pleura or lung, the best results may be expected from the resection of a rib with free drainage of the pleural cavity.

Hull and Guillemont report a case of purulent pleurisy in which the pus was of bright green color, of oily consistency, and the odor of hydrogen sulphide. A peculiar single anaërobic germ was found in clear culture.

Asthma. It is asserted by Stanley¹ that asthma is infrequent in children. He believes that many cases regarded as such are simply attacks of bronchitis which assume a spasmodic character. He has found the fluid extract of *grindelia robusta* to give almost instantaneous relief in some cases.

Pneumothorax. This is a rare condition in childhood, with scant references in the literature. Bovaird,² however, reports five cases and has collected thirteen others. From his study of this limited number of cases it would appear that pneumothorax in children is most liable to occur in the diseases which are characterized by their tendency to bronchitis, bronchiectasis, and bronchopneumonia, namely, measles, diphtheria, and whooping-cough. It occurs also in association with the lungs, but apparently not with the frequency that West has noticed to prevail in adult life. As only four of the eighteen cases collected recovered, pneumothorax in childhood must be considered a very grave complication. Experience is too limited to attempt to formulate any rules for the treatment of the affection, but the extensive displacement noted in one of Bovaird's cases, and the evidences found of resulting interference with the function of the heart, suggest the advisability of withdrawing the air from the pleura ; or, in the event of failure of this procedure, making a free incision into the pleura.

¹ Birmingham Medical Review, February, 1903.

² Archives of Pediatrics, November, 1903.

DISEASES OF THE HEART.

Endocarditis. The etiology of endocarditis in childhood is the subject of an excellent paper by Sanford Blum.¹ Endocarditis may occur in fetal life, and may then be a cause of cardiac malformation. In fetal endocarditis usually the right side of the heart is affected, from which circumstance it follows that in infancy the presence of right-sided cardiac disease is not uncommon. The pathological changes in these cases indicate thickening, shortening, and agglutination of the valves. Thus, two of the semilunar valves may be adherent, or a set of valves may be firmly fused, leaving only an aperture in the centre. While fetal endocarditis may be a primary cause of congenital defects, these, once established, are certainly a condition predisposing to attacks of endocarditis in childhood. Acute endocarditis may originate in infancy, but this is rare. Holt says that in the autopsies of over 1000 children less than three years of age not a single case of acute endocarditis was found. Likewise Northrup and O'Dwyer discovered in 2000 autopsies at the New York Foundling Hospital only one case which presented acute inflammatory lesions. After the fifth year of age endocarditis is not uncommon, and in later childhood it is of frequent occurrence.

In a previous paper² the same author considers endocarditis with reference to bacterial agencies. He reaches certain general conclusions as to the causes of endocarditis, and presents the following scheme of classification: congenital and infantile endocarditis (defective development, simple reparative endocarditis, and unknown causes); endocarditis due to known bacterial agencies (*streptococcus*, *staphylococcus*, *tubercle bacillus*, *pyocyaneus bacillus*, etc.); endocarditis associated with definite diseases presumably of a bacterial nature, but of which the bacterial agents are still unknown (rheumatism, chorea, syphilis, the exanthemata, etc.); endocarditis due to mechanical or chemical insults (blows, strains, excretory products, alcohol, atheroma, etc.).

While examples of all these cases may occur in infancy and childhood, the relative frequency of their occurrence presents decided variations from those existing in adults, and the different conditions prevailing likewise exert a decided influence. In childhood the endocardium has less power of resistance than in adult life, and accordingly succumbs to attack more readily. Congenital attacks sometimes exist which at once furnish a weak spot vulnerable to intercurrent factors. Children are the chief sufferers from the exanthemata, and endocarditis secondary to this group of disease is practically exclusively limited in its inception

¹ Archives of Pediatrics, May, 1903.

² American Medicine, January 17, 1903.

to the epoch of childhood. About puberty great demands are made upon the heart, and here, again, the endocardium may be affected. There is in infancy a not insignificant number of cases of congenital endocarditis of a severe grade which never attain adult life ; in fact, the severe cases of congenital endocarditis other than those implicating the pulmonic orifice rarely exceed the age of twelve. The predisposition to occurrence in certain conditions—for example, with rheumatism—is vastly greater in childhood than in adult life. Malignant endocarditis is exceptional in infancy and rarer in later childhood ; when it does occur it is most frequently associated with rheumatism. From the atheromatous ravages of advanced life alone the child completely escapes. The effect which depraved systemic conditions in the mother—alcoholism, metallic poisoning of the blood, etc.—may exert on the endocardial sutures of the fetus can at present only be conjectured. That bacterial endocarditis may occur in the embryo cannot be denied.

Cassel,¹ in a study of 91 cases of acquired heart disease in children, found that articular rheumatism was the cause in 62 per cent. Out of 75 cases of rheumatism observed by him, 51 were complicated with endocarditis. Out of 38 patients with chorea, 15 had rheumatism, and of these 9 also had endocarditis. He has never been able to demonstrate gonorrhœa as a case of heart disease in childhood, although he has observed 82 cases of precocious venereal disease. Scarlatina caused valvular lesions in 4 cases and diphtheria in 1 case. In 18 patients no cause could be determined. Mitral insufficiency was diagnosed in 58 cases, mitral stenosis in 12, and both in 3 cases. Aortic insufficiency occurred three times, and stenosis once. Serous pleurisy complicated the heart disease in 7 cases, and cerebral hemiplegia in 3. Three cures are claimed, all symptoms and physical signs having disappeared.

Pericarditis. The comparative frequency of adherent pericardium is shown by the fact that eighteen cases have been observed by Swift² in St. Mary's Hospital, New York, since 1886. At autopsy the pericardium is found glued to the pericardiac muscle and chest wall, and although valvular lesions are often absent, the occurrence of murmurs is explained by the presence of these adhesions. Enlargement of the liver is often the first sign of adherent pericardium, and changes in the size of the liver frequently mark the fluctuations of the disease. Most of the cases had their origin in rheumatism, though a few result from pneumococcus infection. The clinical signs of adherent pericardium were : a diffused cardiac impulse, sometimes with a drawing-in of the intercostal spaces during systole, and enlargement of the liver, sometimes to such an extent that this organ reached to the umbilicus. If

¹ American Medicine, May 9, 1903.

² Archives of Pediatrics, January, 1903.

the rheumatism could be controlled and the patient given an abundance of nitrogenous food and proper care the prognosis was fairly good.

The prevention and treatment of heart disease received extended attention last year;¹ but little has appeared in the literature of the past year upon these subjects.

DISEASES OF THE URINARY TRACT.

Cystitis. Cases of cystitis in children due to the colon bacillus are reported by Leopold and Levi.² The modes of entrance of the bacillus into the bladder are noted: 1. From without—that is, through the urethra. This can be brought about by use of infected instruments or foreign bodies introduced into the urethra, or the bacillus may work its own way through the urethra when the area surrounding the urethra is infected. The latter is seen especially in the female. 2. From within, through renal tissue. This has been demonstrated experimentally by tying the intestine at the anus and the urethra. The colon bacillus was found in the bladder and kidney. The peritoneal fluid remained sterile, thus proving that the transmission of the colon bacillus did not occur directly from the intestine to the bladder. 3. Also by continuity, when the infection comes directly from the intestinal tract to the bladder. In the three cases reported it was a strikingly noticeable fact that the symptoms were milder, in general, than in similar cases where the streptococcus or staphylococcus is the causative agent. In other words, these cases appear to demonstrate that infection by the colon bacillus is not so virulent as the ordinary pyogenic infections.

Nephritis. The literature of nephritis, pyelitis, and other diseases of the urinary system was for two or three years very large, but during the past year was meagre. The subject of urinary analysis in children and the peculiarities of the urine in very early life were considered in detail last year.³ Five cases of nephritis occurring in children and apparently traceable to a skin affection are reported by Filia.⁴ He believes that the eczematous lesion opened the way for infection through the lymphatics, thence through the general circulation into the kidneys. That this was so seemed probable from the fact that the same organisms found in the skin disease were also present in the urine, and these persisted for some time after albumin and casts were no longer present. It was shown through injections into animals of cultures of staphylococcus found in such urine that the organism has acquired a high degree

¹ PROGRESSIVE MEDICINE, March, 1903, p. 351.

² Archives of Pediatrics, May, 1903.

³ See PROGRESSIVE MEDICINE, March, 1903.

⁴ Policlini., February 14, 1903; Medical News, April 4, 1903.

of virulence compared to staphylococcic cultures from other sources. This is in accord with the experimental experience that the addition of urine to ordinary culture media increases the pathogenic power of organisms so cultivated. Examination of the blood of the animals which had received the injections showed staphylococcic septicæmia in twenty-four cases out of thirty-three.

Decapsulation of the Kidney, sometimes known as Edebohls' operation, has received some attention during the year. Rotch¹ reports a case of a child, aged nine years, with a severe nephritis, who never had had scarlatina. Edebohls' renal decapsulation was employed, and the child died two weeks later. Dr. Rotch lamented the fact that renal disease was at present so little understood, and that there was as yet no appropriate nomenclature to designate the various pathological conditions. The marked beneficial results that had been attributed to this operation had attracted much attention, but many of these cases may have been functional cases, in which recovery would have taken place had no operation been resorted to. Nephritis in adults and children are two distinct conditions, and should be studied separately in order to discover which are favorable and which are unfavorable for operation. In discussing this case B. K. Rachford said that most cases of nephritis in children were doubtless due to an infection of some kind and tended to complete recovery, while in adults the tendency was for the condition to become chronic. For this reason the value of the operation should be determined by the results in adults. It was impossible to determine the value of operative measures in cases of less than six months' standing, for the ultimate conditions might have been the same, or even more favorable without operation. Dr. Edebohls himself says that the surgical treatment of chronic Bright's disease is not at all a settled matter, that it is still on trial, and that the final word will not be spoken for several years to come, until we know the ultimate results in the advanced cases which are at present being operated upon. This is undoubtedly a fair statement of the status of the question at the present time.

Tumors of the Kidney. Our knowledge of congenital tumors of the kidney is of comparatively recent date. Our first clear understanding regarding them began with the work of Grawitz, who, in 1883, recognized the adrenal origin of a certain class of these growths. Birch-Hirschfeld, in 1898, studied a second group, which are characterized by their occurrence in early life and by their rapid growth. He showed that what had previously been described as carcinomata, sarcomata, endotheliomata, rhabdomyomata, etc., belonged in reality to

¹ Medical News, May 30, 1903.

one class which he denotes as adenosarcomata. Of other primary malignant growths Birch-Hirschfeld recognized carcinomata, although these are extremely rare. Pure primary sarcomata might be expected *a priori*, but the reported cases have been too few to establish this class with certainty. In an extended article on the subject Lawrence W. Strong¹ says that the most striking thing about malignant tumors of the kidney in general is that, though they develop in the kidney substance, their structure and elements are totally unlike those of the kidney itself. This applies both to the adrenal growths and to the congenital tumors, which two classes constitute by far the large majority of all renal tumors. Sometimes the glandular elements predominate, and sometimes the connective tissue. So that it is not strange that the earlier authorities described such tumors as carcinomata or sarcomata, as the section studied showed one characteristic or the other. In the classification of one of these tumors their embryonic origin is the fundamental consideration. The term carcinoma cannot be applied, as the adenomatous type is evident, and as the epithelial elements do not take origin from developed glands of the kidney.

Enuresis. In considering the treatment of this condition Zahorsky² classifies the various remedies that have been used as follows: measures to inhibit the contractions of the bladder; to lessen the irritability of the neck of the bladder; to diminish the acidity of the urine; to lessen the quantity of the urine; to increase the tonicity of the neck of the bladder and the nervous system.

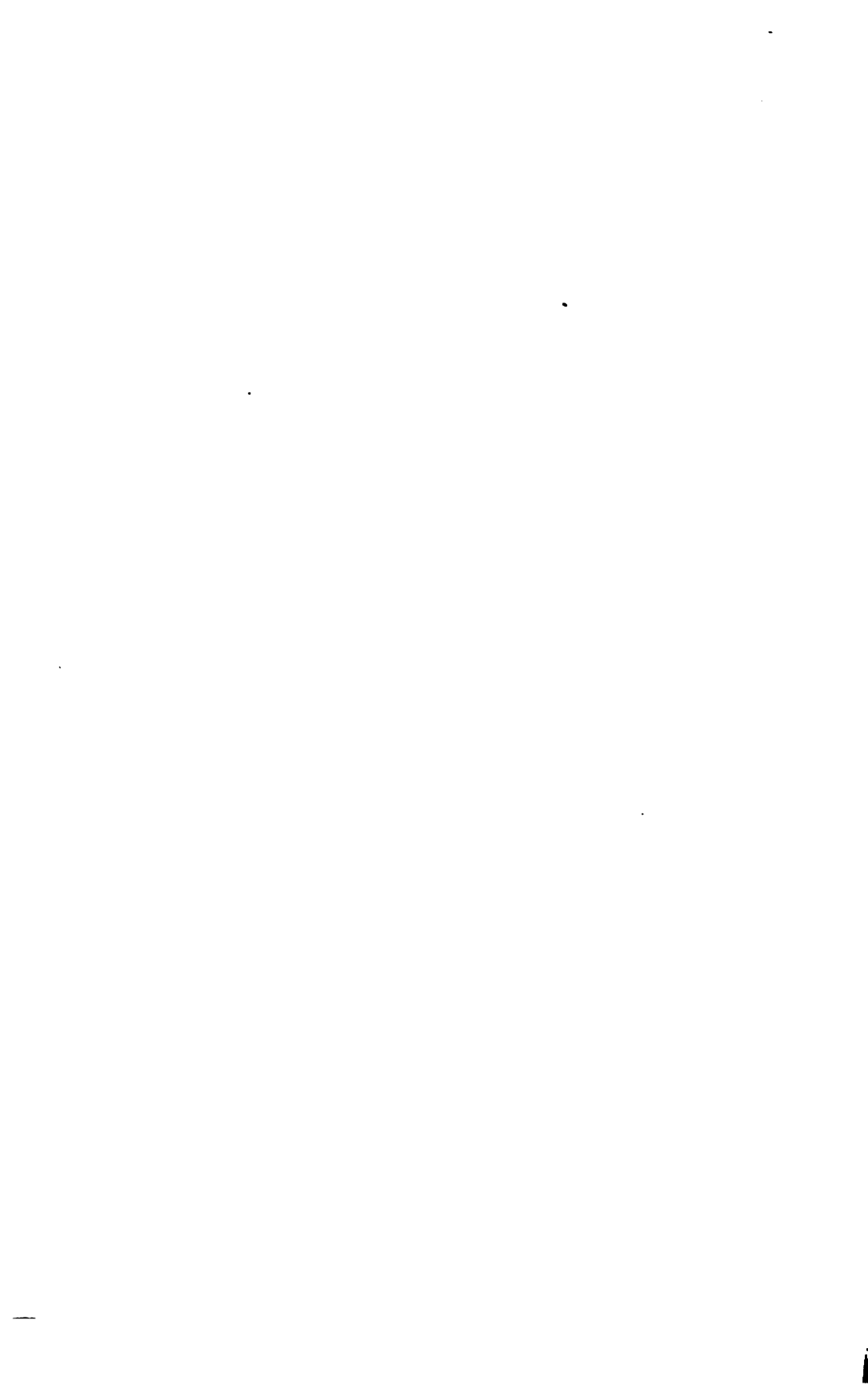
Remedies to inhibit the irritability of the neck of the bladder are numerous. Martin advocates the use of antipyrin. It has become a favorite remedy. Others have found the hypnotics beneficial—*e. g.*, chloral, sulphonal, etc. Opium and its alkaloids have been used for this purpose. The administration of alkalies and their citrates and acetates to diminish the acidity of the urine is a common practice. They also act as diuretics, and in this way diminish the quantity of the urine at night. Means to lessen the quantity of urine have not received sufficient attention. The older writers particularly agreed that the ingestion of fluid be diminished, but Holt warns that this renders the urine more concentrated and, therefore, more irritating. We have no drug which inhibits the secretory power of the kidneys, though ergot and belladonna have been used for this purpose. The former drug certainly diminishes the flow in diabetes insipidus, and its therapeutic value in enuresis may depend on this action. *Rhus aromatica* and *rhus glabra*, probably, also diminish the secretion. The secretion at night may be somewhat lessened by stimulating the secretion during the daytime. We may,

¹ Archives of Pediatrics, May, 1903.

² Interstate Medical Journal, July, 1903.

therefore, prescribe some diuretic during the morning and noontime, followed by belladonna or other drug at night.

Measures to increase the tonicity of the neck of the bladder are commonly employed. Ergot and strychnine are the usual remedies for this purpose, although they must at the same time augment the contractibility of the bladder. The method employed by Zahorsky in a boys' orphan asylum was as follows: The boy was stripped and placed standing in an empty bathtub. A basin or a vessel with a spout to it like a watering can was filled with cold water and poured over the shoulders and down the back of the subject. In nervous, delicate children one dash of the water was sufficient for an application; in the sluggish, phlegmatic lads the dose might be repeated. The boy was immediately rubbed down, dressed in night-clothes, and put to bed. Sponging the back with cold water does not have the same effect as douching. In conclusion, he advised the following plan of treatment: 1. Two doses of a diuretic during the day, one at 9 A.M., the other at 2 P.M. The alkaline citrates with spirits of nitrous ether are usually best, but caffeine and diuretin and sodium benzoate may be used. 2. Give one dose of atropine at night. Instead of atropine *rhus aromatica* or antipyrin may be used. 3. Pendergast's method of douching the back.



LARYNGOLOGY AND RHINOLOGY.

BY CHARLES P. GRAYSON, M.D.

The Relationship of Diseases of the Nose and Throat to Systemic Disease. From out the mass of work that has contributed with more or less credit to the history of rhinolaryngology during the past year there is scarcely anything that appears more distinctly or is more significant of the best kind of progress than the fact that a steadily increasing number of the followers of this specialty are recognizing the intimacy of the pathological association between the upper air and digestive tracts and the rest of the body. The fact that a very large proportion of the diseases of these regions find their origin in primary systemic disturbances, and must find their cure in primary systemic improvement, is securing a much wider appreciation and a much more numerous following. During the past several years there has been published at long intervals a small number of papers that have urged the value of general treatment in a certain few diseases of the throat and nose ; but now the horizon is broadening, the writers have become bolder, and we are being told much more frequently and forcefully that we cannot rationally expect to obtain from merely local treatment anything more than moderate and short-lived improvement of any of the catarrhal infections or specific inflammations of these regions. It is, indeed, high time that a revival of interest such as this in general pathological processes in their relation to the special ones of the nose and throat should occur. In spite of warnings and protests from men well qualified to utter them, a large proportion of each year's graduates in medicine ignore the value of a thorough preliminary training in the field of general medicine, and take up at once the study of one or other of the several specialties. And these are the men who impede instead of stimulating progress in any of these special branches of medical or surgical work. They almost inevitably become narrow and superficial, and those of them who adopt rhinolaryngology are the ones who become addicted to an unvarying routine of sprays, pigments, and powders, with no intelligent comprehension of the real nature of the diseases that they treat. Upon the minds of all such men, be they young or mature, papers like that of Stucky¹ should throw such a

¹ *Annals of Otolaryngology, Rhinology, and Laryngology*, May, 1902.

flood of light as will reveal to them their own pitiful limitations and compel them either to become more scientific in their attainments and practice or to confess themselves mere mechanics.

What Stucky has said of the value of general treatment in lithæmic pharyngitis is entirely applicable to any of the other catarrhal inflammations of the upper air or digestive tracts. The pathogenesis of these affections invariably begins in some disturbance of the digestive and nutritive processes—a disturbance which has its ending in those blood dyscrasie which are rather loosely grouped under the titles uricacidæmia, lithæmia, gout, etc. The rôle played by uric acid in originating the catarrhal process and in establishing it upon the mucous membranes of the digestive and respiratory tracts has doubtless been greatly exaggerated; it has served as the scapegoat for the faults of many other toxic agents; but the main and essential point is that it is only through the thorough cleansing of the blood and the tissues of the toxic accumulations of years that we can rationally expect to lessen the frequency of acute or to check the continuance of chronic inflammations. The absurdity of attributing solely to some real or fancied exposure the every-day coryza or pharyngitis is daily becoming more apparent. Why is it that of a group of people subjected to exactly the same exposure, one develops a coryza, another a pharyngofaucitis, another a laryngitis, a fourth a bronchitis, while the others escape with nothing more than a scarcely noticeable temperature reaction following the chill? In the first four of these people wet feet and some local abnormality may come to the front of the stage and attempt to explain how it all happened, but accompanying each of them there is a systemic background that, perhaps, needs a sharp pair of eyes for its detection, but which, nevertheless, is of much greater pathogenic importance than either the exposure or the local factor. And it follows that it is this systemic fault that should receive the lion's share of our therapeutic attention. Local cleansing sprays and soothing applications may palliate and satisfy for the moment, but it is only a general and thorough internal scouring that can put an end to the tiresome repetition of such attacks. We cannot have too many papers that will emphasize this matter.

Paraffin Prosthesis. A year ago we were still speculating as to whether the use of paraffin by the rhinologist for the correction of certain deformities of the nose and of the contiguous structures was to be regarded as a passing fad, or whether it would become a permanent and valued addition to our long-established prosthetic measures. The papers that have appeared and the discussions that have occurred during the past twelve months respecting this subject, as well as the personal experience of those of us who have essayed the method, have

so greatly added to our information concerning it, its limitations, its few attendant dangers, and its technical details, that we may now, I think, predict for it an enduring popularity in the rather small number of cases to which it is applicable. Even under the most favorable circumstances, however, it is an operation that, like matrimony, should not be undertaken "unadvisedly or lightly." Few as they are, its possible dangers are real ones, and the fact that by proper care and sufficient technical skill they may be almost eliminated makes it important that neither care nor skill should be lacking in its performance. The unfortunate mishaps that have befallen some operators seem the more unfortunate because we know now that with certain simple precautions and a little more proficiency they might have been avoided. In the first place, some discrimination should be exercised in the selection of cases. For instance, the enthusiasm of the paraffin artist should not lead him to attempt the correction of deformities so slight that they are more apparent to the mind of the patient than to the eye of the observer. Such patients are almost always hypersensitive about the slight blemish, and, to quote Connell, "are more than likely to be dissatisfied with the result of the attempted improvement, even though it be satisfactory from a surgical point of view."

Those interested in this procedure should read the papers of Paget,¹ Connell,² Harman Smith,³ and Franke.⁴ These furnish a comprehensive description of the operation in all its details, and give the several technical improvements that have been successively introduced since Gersuny, in 1900, published the first reports of his cases. The most complete of these papers is that of Connell, and I shall insert here a few extracts from it that are of especial practical value. To be forewarned of the possible causes of failure is to be forearmed, and Connell enumerates these as follows :

1. Toxic absorption.
2. Marked inflammatory reaction.
3. Loss of tissue, due to infection and abscess formation.
4. Pressure necrosis, caused by the injection of too much paraffin.
5. Sloughing of tissue as a result of the heat of the paraffin.
6. Injection into very dense or inelastic structures, or where scar tissue is firmly attached to the underlying and adjacent parts.
7. Injection of too small an amount of paraffin, with an insufficient correction of the deformity.
8. Injection of too large an amount of paraffin, with an overcorrection of the original deformity.

¹ British Medical Journal, January 3, 1903.

² Journal of the American Medical Association, September 19 and 26, 1903.

³ Ibid., September 26, 1903.

⁴ Cent. f. Chirurgie, Leipzig, No. 2.

9. Air embolism.
10. Paraffin embolism.
11. Extension of the paraffin when first introduced into adjacent normal structures, such as the infraorbital region.
12. Interference with the muscular action of the nose.
13. Escape of the liquid paraffin after the withdrawal of the needle.
14. Solidification of the paraffin in the needle, which renders the injection difficult and causes injudicious expedition on the part of the operator.
15. Absorption or disintegration of the paraffin.
16. The difficulty of procuring paraffin with the proper melting-point.
17. A resultant hypersensitiveness of the skin over the injected area.
18. A marked and more or less permanent redness of the skin over the injected area.

These possible accidents are discussed in succession, and for each of them is given the means to be employed for its prevention. The tissue necrosis, for instance, that is liable to follow the injection of an excess of paraffin is to be avoided by keeping one's self constantly informed of the gradually increasing amount of tension that attends the injection. The fingers that mould the paraffin convey this information to us, and at the same time the skin covering the injected mass should be carefully watched to see that its circulation is not being seriously embarrassed. A very reliable way of avoiding this accident is to correct the deformity by two or three repetitions of the operation instead of attempting it at one sitting.

It seems to be proven that the danger of embolism as a complication of this operation is greatly increased by the use of a paraffin of low melting-point. The low limit of safety in this matter seems to be 110° F. The substance when injected should never be perfectly fluid, but should "emerge from the needle in a thread-like string." Another precaution to be observed is that the injection should be made into the immediate subcutaneous tissue rather than into the parenchyma.

Spreading of the paraffin into the tissues adjacent to the nose, as for instance into the loose infraorbital areolar tissue, is to be prevented by having an assistant make firm pressure with his fingers along the borders of the region to which it is wished to limit the injection. The immediate application of an ice-water dressing will also, by hastening the setting of the paraffin, lessen any tendency to its going astray.

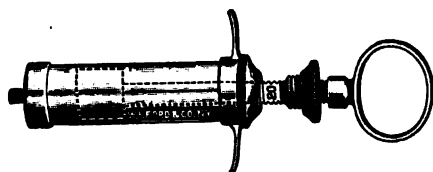
Quite a variety of syringes have been employed for this operation, and a good deal of ingenuity has been displayed in the various measures that have been suggested for keeping the paraffin from solidifying within the syringe. These latter precautions, however, are rendered

unnecessary by the use of a syringe, the piston of which has a screw-worm upon its rod, and a thumb-screw riding this that can be fixed to the barrel of the syringe. By such an arrangement the piston-rod can be screwed down upon the contents of the instrument, and the semi-solid paraffin expelled evenly and slowly, with no sudden variation of the force applied and, therefore, no danger of a sudden hyperinjection. The capacity of the syringe should be about 90 m., and its needle a trifle shorter, and with a slightly larger lumen than that of the ordinary hypodermic syringe.

The diversity of opinion which exists as to the melting-point which should be possessed by the paraffin extends from 102° F. (Parker) to 140° F. (Karewski). We have already intimated that for several reasons 110° F. is the melting-point that gives us the more generally useful and easily handled material, and this can now be obtained in the shops in sealed sterile test-tubes.

The technique of the operation as first practised by Gersuny has undergone very little alteration. The preparation of the patient and

FIG. 8.



The Harman Smith syringe.

of the field of operation should be most thorough. No more than ordinary surgical technique is required, but it should be complete. The integument of the nose and surrounding territory is to be well scrubbed with green soap and water, alcohol then freely applied, and this followed by a 1:5000 bichloride solution. The hands of the surgeon and assistants are surgically cleansed, the syringe and needle boiled and then allowed to cool sufficiently for comfortable handling. At the point selected for the introduction of the needle three or four drops of a 2 per cent. solution of cocaine may first be injected at the discretion of the operator. Even this local anæsthesia, however, may be dispensed with in the majority of cases, and it must be extremely seldom that general anæsthesia is either necessary or justifiable. The paraffin having been melted is drawn into the syringe, the needle is attached and the air expelled from it. The paraffin is now allowed to cool to a point at which it emerges from the needle in a thread of ointment-like consistence, "easily mouldable and quite incapable of forming an embolus." The needle is then introduced and carried just

beneath the skin through the field of deformity and slightly beyond it. The injection is now begun, and is slowly continued, with frequent interruptions to permit of its being properly moulded. The needle is gradually withdrawn during the injection, and when finally extracted the minute wound is closed with collodion, and the area sprayed with ether or enveloped in ice-water dressings to hasten the setting of the paraffin. In very many cases it will be found wise not to attempt the entire correction of the deformity at one sitting, but to make use of two or three. In this way the result may be made more accurate and satisfying. For the first several hours, or even days, following the operation there is apt to be a moderate amount of redness, of pain, and swelling of the nose, but these usually rapidly subside under the influence of the cold dressings that are applied.

Hay Fever. Probably more nonsense has been written and talked about hay fever than any other half-dozen diseases of the nose combined. For almost a half century it has been the occasion of constant study, of perpetual conjecture, and of all sorts and varieties of hypotheses. And, in spite of all this, there are still to-day certain features of it that are as unfathomably mysterious as they were when the disease was first recognized and given a name. Its etiology shares with that of atrophic rhinitis the questionable honor of defying elucidation, and its treatment even surpasses that of the latter disease in the number of follies and absurdities to which it has given rise. Concerning its etiology we can be certain of but two things: that its exciting cause is some form of external irritant, and that among its predisposing causes the most prominent is an idiosyncrasy. That is practically the sum and substance of what we *know* concerning the causation. Of course, we all suspect a great deal more than this, and our suspicions are more or less diverse and more or less, generally less, well founded; but the fact remains that they are only suspicions, nothing more. And it goes without saying that it is idle for us to hope for a successful or, at least, anything more than an empirical method of treatment so long as we are only guessing at the nature of the disease that we are attacking. It is with reference to this question of causation and incidentally to that of treatment that the investigations and experiments of Dunbar during the past several years attract our watchful interest.

In an article¹ published in the early part of the past year he gives some of his further observations on the cause and specific treatment of this disease. In view of the difference of opinion among the large number of observers as to whether the exciting factor of hay fever was to be found in pollen or in some variety of micro-organism, Dunbar

¹ Deutsche med. Wochenschrift, February 16, 1903.

began his investigation upon the assumption "that it would be possible to arrive at correct conclusions in regard to the cause of hay fever only if it were possible to separate the factor completely from the foreign elements, and by means of this factor, independent of temperature and meteorological conditions and at a time of the year different from the typical one, to cause all the symptoms of hay fever; and, furthermore, if it were possible, to prove that it attacks only those persons who habitually suffer from hay fever and that all others are immune to it."

He made the preliminary observation that "the pollens of rye, barley, wheat, rice and corn, and all other graminous substances which cause symptoms of hay fever in those subject to the disease are entirely innocuous to other persons. Furthermore, the pollens of all other plants examined by him, among them the rose, linden, absinthe, and many others which other authors claim are noxious, were found to be without any action in hay fever patients."

By experiments made in December and January the author was able to demonstrate "that the hay fever sufferers were sensitive to the specific poison not only in the spring and summer months, but at all other seasons of the year."

By treating the noxious pollens with ether and other chemicals the author was able to show that their active principle was not the ethereal oleaginous constituent, as the early authors thought. This active principle was found to be completely insoluble in alcohol and ether, but more or less readily soluble in water or saline solution, according to the kind of grass. It was also quickly soluble in tears, the nasal secretion, saliva, and blood serum.

From an analysis of the results of his experiments Dunbar was led to the conclusion that the active principle was represented by the starch bodies, which, by the way, are not composed of pure amyllum, which are the chief constituents of the pollen grains. This irritative principle is probably contained in the so-called amyllum bodies, and seems to be an albuminous substance. One of his early experiments with the toxic material upon a hay fever subject is given in this article. The substance was injected hypodermically in the forearm, and within ten or fifteen minutes all the usual symptoms of the disease had appeared, and in a decidedly virulent form. In a control case, a non-sufferer from hay fever who was given the same dose and in the same way, the poison proved to be completely inert. Dunbar says that all his experiments led to the same results, irrespective of whether the pollen grains were inspired in their natural condition or their active principle was introduced into the eye or nose in solution.

Another series of experiments was carried out in January, 1903, and considering the complete coincidence of the results obtained, which

were derived from nine hay fever sufferers and more than twenty control patients, the author ventures to state with much certainty that "pollen toxin gives rise to corresponding specific irritative symptoms in hay fever patients, but is completely inert in others than these."

As a complement to these experiments, others were made with an antitoxin obtained by the author by injection of the contents of the appropriate grains into animals. From these it was seen that it was possible to completely or almost completely neutralize the pollen toxin by mixing it with the antitoxin in the test-tube. This being known, a drop of a very powerful pollen toxin was instilled into an eye, and upon the reddening of the caruncle and the appearance of the burning a drop of the antitoxin was introduced which immediately relieved these symptoms. It had to be repeated several times, however, in order to prevent the return of the disturbance.

Dunbar is not yet ready to answer the question as to whether it will be possible to prepare a serum, one injection of which would be sufficient to immunize patients for a long time against this disease, nor will he even venture to predict the possibility of a permanent immunity to hay fever.

Specimens of the toxic material and of the antitoxic serum have been used by Semon, in England, and Mayer, in this country, and while their experiments confirm to a certain extent those of Dunbar, his results have scarcely been duplicated by them. However, even if we grant that the essential irritating principle of the exciting cause of hay fever has been run to earth, and a serum developed that will antagonize and, perhaps, neutralize it if it be used early and often, are we so very far advanced beyond the therapeutic potentialities of cocaine and the suprarenal products? These, if intelligently used by the physician or patient and in conjunction with certain systemic measures will greatly palliate the more annoying symptoms of the disease and enable the victim to pass through its customary period of activity in comparative comfort. Possibly, with further investigation, Dunbar's serum may enable us to accomplish something more than this; but it seems to me that we can never hope either to prevent or effectually control this disease, or, in other words, to render the patient entirely immune to it until we can succeed in removing the systemic factor, the so-called idiosyncrasy, that makes the patient susceptible. By general acceptance this idiosyncrasy is of a nervous nature and consists of a hyperæsthesia of the nasal sensory nerves, which, when irritated by the pollens of certain grasses or weeds, induces a vasomotor paralysis manifesting itself in engorgement of the turbinates with all the other sensory and secretory disturbances of this disease. I can think at the moment of scarcely any other disease the treatment of

which has been so strictly symptomatic as this. The recognition of the nervous causative factor has been the excuse for the employment of almost every remedy that could be regarded as a nerve sedative, alterative, antispasmodic, or tonic. We have gone up the gamut and down again so often that all the combinations have been exhausted, and those who still hope to find a cure for hay fever in drugs will vainly keep on doing this until the end of time. To my mind it seems much more rational, and my experience has strengthened the opinion, that we should find and treat the *cause* of the systemic fault instead of being content with the recognition and treatment of its effect. In a very large number of cases what we are pleased to call the "neurotic temperament" is merely secondary to or is the outgrowth of some diathetic state that is rooted in defective nutrition. Whatever we term this—lithæmia, or the gouty or uric acid diathesis—is immaterial, the essential fact being that through intestinal toxæmia or some disturbance of normal metabolism there results a persistent poisoning of the blood current. At the very moment that contamination of the blood occurs there is inaugurated an increasing irritation and a steadily diminishing stability of the reflex nervous centres. The vasomotor centres are early affected, and when their loss of equilibrium is, perhaps, added to a long precedent nasal lesion that has rendered the pituitary mucous membrane particularly intolerant of any form of irritant, we have but to await the floating of some variety of pollen into the nostrils to witness the speedy evolution of this disease.

With this conception of the systemic causative factor of hay fever it should not be very difficult to outline a common-sense plan of treatment. Instead of trying to abolish the special susceptibility or idiosyncrasy by means of antitoxins and nerve tonics and sedatives, will it not be much more sensible to attempt its removal by eliminating from the tissues and the circulation everything of a toxic and irritant nature that can disturb the nerve centres and overstimulate the terminal nerve filaments? At the very outset of such a plan of treatment as this the patient must be made to understand that it is only with his faithful co-operation that it can succeed, and with this made clear to him we are ready to open a joint attack upon the host of hygienic blunders and perhaps wilful bad habits that we are to meet and overcome—irregularities connected with the patient's hours for meals, for work, rest, and play; indiscretions of diet, lack of exercise, objectionable fancies in matters of clothing and bathing, and, finally, vicious excesses—alcoholic, narcotic, or sexual. There can be no mistaking the purpose for which this critical oversight of these matters is suggested. Everything that will lessen in any degree the patient's general vitality and vigor should be removed from his scheme of life, and everything that

will contribute to his physical and more particularly his nutritive and nervous welfare should be added. After a reform has been effected in any habits of a vicious nature the accurate adaptation of the diet to any inherited or acquired morbid state is to be one of the next essentials. In this dietary scheme the age, the sex, the occupation, the whole environment of the patient must be separately studied and provided for; and in the closest possible association with the regulation of food is that of exercise. Judiciously advised, with careful reference to the condition and needs of the patient, it is worth all the drugs of the pharmacopœia. Does it not seem not only a plausible but a perfectly rational proposition that if a man takes care of his muscles his nerves will take care of themselves? It is, then, in the skilful blending of diet and exercise and their application in proper proportions to each of these patients that, it seems to me, we have the one rational and reliable method of removing the constitutional factor that is so active in the causation of hay fever. Within a reasonable time the digestive tract will be restored to a state of sanitary purity, general nutrition established upon a firm foundation, and the previously unstable nervous system, steadied and invigorated, is enabled to resist such disturbing influences as once proceeded from the contact of atmospheric irritants with the hyperæsthetic pituitary membrane; the vasomotor centres resolutely resume their domination over the nasal erectile structures, and the distressing phenomena of hay fever will be known no more. The essential idea is to put the patient upon a course of strict training that will bring out all his capacity for self-denial and self-help; that will effect a most salutary change in his whole *morale*, and will so completely remove the hyperæsthesia of the nasal sensory nerves as to make them quite indifferent to a species of irritant that once sufficed to throw them into a state of violent commotion. This plan of treatment penetrates to and combats the very beginnings of pathogenesis. Dunbar's antitoxic serum certainly does not, and I cannot but await the results of his further experiments with a considerable amount of skepticism mingled with my hopes.

Atrophic Rhinitis—Ozæna. The literature of this disease during the past year has been just as abundant and inconclusive as ever. The discussion of its etiology so far from flagging has been conducted with renewed spirit and energy, and yet it must be confessed that we are as far from a general agreement upon this point now as we were twelve months ago. One or two new theories have been propounded and some of the old ones have made concessions to criticisms, have been remodelled, and are again striving for favor. Grünwald continues to insist that rhinitis atrophica is secondary to one or more of the sinusites, but so much evidence has been brought forward to disprove this

that he shows some signs of weakening. Two papers were presented at the Madrid meeting of the International Medical Congress last April which are worthy of something more than the customary brief reference. The first was that of Freudenthal (New York). Under the title "Is Atrophic Rhinitis Always Autochthonous?" he gives a short preliminary account of the earlier work in this disease, and follows this with an estimate of our knowledge concerning it at present. The theories concerning its etiology are briefly discussed, those which hold local affections responsible; empyema of accessory sinuses; infection; and then follows an account of the author's personal researches on retronasal catarrh and atrophic rhinitis (ulcus perforans of the septum, anterior atrophic rhinitis of Siebermann-Ribary; epistaxis, especially in winter and after prolonged acute illness). In this connection Freudenthal considers the effects of too dry air upon the natural secretion of the scalp, the external auditory canal, the lips, and, finally, he reviews the principal conditions which combine with atrophic rhinitis to convert it into ozæna. His conclusions are summed up as follows:

1. Ozæna is an atrophy of the nasal interior which is the result of atmospheric influence, especially too great dryness of the air—xerasia.

2. The bony framework of the turbinates appears to be affected very early in the disease.

3. The effects of a lack of atmospheric humidity are very extensively apparent: (a) within the nose, including diseases which have been attributed to other causes, as, for example, the *ulcus septi nasi perforans*, *rhinitis atrophica anterior*, some form of epistaxis, etc.; (b) neighboring parts of the body: the scalp, ears, lips, teeth; (c) probably, also, in distant organs.

4. For the addition of ozæna to the atrophic process there must be an abundant invasion of an organism very similar to Friedländer's *pneumobacillus*. This bacillus can thrive and multiply only on a suitable soil—i. e., only where atrophic conditions already exist.

5. This invasion occurs at an early period of life, and may be due in some cases to direct transmission from the vulva.

6. Accessory sinus disease often accompanies atrophic rhinitis, but it is probably almost invariably secondary to it.

7. After all has been said, ozæna should be regarded as a genuine and autochthonous disease, supervening upon the atrophic process.

Of course, the "dry air" theory of Freudenthal is to be taken seriously and treated with proper respect; but, nevertheless, it does not require a very analytical mind nor any great amount of reflection to find a fatal number of flaws in it. These will readily suggest themselves to anyone who has had even but a moderate experience with the

disease, and there is no occasion to indulge here in any extended argument to prove that the hypothesis is not only unwarranted by facts but that it is wanting even in the elements of plausibility.

The second of the two papers referred to was that of E. J. Moure (Bordeaux), and its title "Le coryza atrophique, est-il une affection autonome?" ("Is Atrophic Coryza an Autonomous Affection?") This paper will be found in full in the *Revue hebdomadaire de laryngologie, d'otologie et de rhinologie*, October 3, 1903, and is one of much more than ordinary interest. There is nothing dry or trite about it, and his breadth of view of the subjects of etiology, diagnosis, and treatment is decidedly refreshing. An abstract in English is given in the *Journal of Laryngology*, June, 1903.

He thinks it desirable in the first place to distinguish the several clinical varieties of this affection concerning which rhinologists still disagree in spite of the continuous discussions of the subject throughout the whole medical world. There is certainly a great divergence of opinion among specialists as to the clinical forms of this rhinitis, which some describe under the vague term "ozæna" or "true ozæna," others under the simple name "atrophic rhinitis."

Both of these denominations are incomplete, because ozæna may exist without atrophy and atrophy without ozæna. The term "ozænatous rhinitis," although more exact, is descriptive of the affection only in its early period, when the abundant purulent secretion tends to accumulate in the nasal fossæ and to decompose there. On the other hand, when the pathological process has destroyed all the glands and almost all the osseous tissue, the odor disappears from lack of secretion, but as the atrophy has by that time reached its most advanced stage, the name is no longer appropriate.

Again, there can be no doubt that certain coryzas destined to become ozænatous and atrophic commence as purulent rhinitis, with liquid, inodorous secretion, or, at least, with secretion that smells stale and disagreeable, but not fetid.

At this stage the mucosa is swollen (the hypertrophic stage of some authors). Here the term "ozænatous atrophic coryza" is not apt, especially as certain purulent coryzas never give rise to true ozæna, although their final stage is one of atrophy of the Schneiderian membrane and turbinal bodies.

Lastly, we all know that of late years certain authors—in particular Grünwald—regard ozæna as originating in sinusitis, declaring that if one cannot always discover the sinus affection, the sinusitis is simply situated where it is difficult to recognize. We cannot admit such a radical opinion, because at the present time the various accessory cavities of the nose are comparatively easily inspected, and it is impos-

sible to believe that suppuration in any one of them could long escape detection if carefully and repeatedly sought for.

However that may be, we need not be astonished if, with the different forms of the disease to which allusion has just been made, treatment should be regarded by some authors as effective, even curative, and by others as absolutely without effect on the disease itself. This divergence of opinion is due not only to the variety of clinical forms of the affection, but also to the period at which the examination is made and to the age of the patient. No doubt atrophic coryza will offer varying degrees of resistance to treatment according as it occurs in the adolescent, the adult, or the aged. Moreover, as Trousseau observed, in spite of considerable or even excessive enlargement of the nose cavities in old people, one seldom finds a case of true ozæna.

As to the question whether ozæna is an autonomous disease, that can be answered only after considering the different aspects under which it appears. To my mind, it is correct to say that an atrophic coryza which commences in childhood as a rhinitis purulenta, generally accompanied by one or more sinusites, is, so to speak, a secondary affection—an affection which can well be checked if one gets the chance of treating it in its early stages; that is to say, before the atrophic process is thoroughly established or the formation of fetid crusts has begun.

Again, in certain adults a peculiar form of pseudoatrophic rhinitis is found—a form that I would be inclined to call strumous. In it the turbinals are atrophied, the secretion is mucopurulent, with a tendency to the formation of brownish crusts which, however, are never thick, and do not give off the distinctive odor of true ozæna. The atrophy is usually accompanied by the presence of adenoid vegetations (adenoiditis suppurativa), and even by submaxillary and cervical adenitis. In this form, too, affections of the maxillary, ethmoid, and sphenoid sinuses are not rare, although not so common as in the preceding form. This may be termed a prebacillary coryza, because the same condition of the mucosa is found in tuberculous subjects, in patients with lupus of the face, and even in patients who later will present signs of lupus of the nasal mucosa. Everyone who has examined the nasal fossæ of such patients must have observed that when the lupus is still confined to the one fossa the other fossa shows this special form of atrophy of the inferior and middle turbinals, with formation of brownish, non-fetid crusts. It is, so to say, the initial stage of lupus. This form of coryza is obviously constitutional, autonomous, and inherent in the individual affected.

Lastly, there is the *atrophic coryza*—which is often congenital, almost always hereditary—characterized not only by diminished size of the

inferior and middle turbinals—often reduced to little ribbons—but also by the presence in the nose of dark, thick crusts, which separate with difficulty only every fifth, sixth, or eighth day, and give off the special odor from which the name *ozæna* is derived.

Here, again, there is often evidence of sinusites of nasal origin, the teeth of the upper jaw being in perfect condition. In the general run of cases the maxillary antrum is found to contain a gummosus, grayish pus of a quite peculiar kind. This is obviously the most persistent and obstinate form. It is well characterized. All rhinologists will at once recognize the variety alluded to. The fetor is due to the nature of the nasal secretion on the one hand and to the considerable enlargement of the cavities on the other.

TREATMENT. After what has been said it is scarcely necessary to devote much time to treatment. It may be summed up as follows:

1. In the purulent *ozæna* of adolescents the inflamed and swollen adenoid tissue should be removed, and thereafter the nose irrigated regularly. In such cases massage followed by a nitrate of silver spray (as recommended by Meyjes) is excellent treatment. Although the mucosa of the inferior and middle turbinals appears hypertrophied, it ought not to be treated by surgical methods unless it is quite degenerated—*i. e.*, polypoid. Such swellings diminish gradually under suitable treatment regularly applied, whereas resections of the mucosa, cauterization with the galvanocautery, etc., sometimes give rise to outbursts of acute infection.

2. In the strumous pseudotrophic coryza, which has been mentioned, nasal irrigations combined with treatment of the general condition is all that should be tried. The results are not infrequently quite satisfactory. Of course, if either of these forms of *ozæna* is accompanied by sinusitis this must be treated just as an ordinary sinusitis, but the pituitary membrane ought to have recovered nearly its normal appearance before the sinus is touched.

3. Lastly, in the atrophic *ozænatous* coryza (true *ozæna* of Martin) in its active stage, in young children it is best to use only irrigations, etc., of the nose until the patient has reached an age at which more active surgical treatment can be applied—*i. e.*, about the age of six to ten years. Then an attempt may be made to reconstruct the turbinals by means of interstitial injections of paraffin. There is no doubt that this is a remedy not only for the secretion, but also for the odor. After the injections the secretion changes in character; then, as the patient can blow his nose better, the stinking crusts with which we are all so familiar no longer collect in his nasal fossæ. The introduction of the paraffin treatment appears to have revived the so-called Zaufal's theory. Indeed, if we reflect upon the usual appearances in any case

of ozæna, we will remember that in a case of well-marked atrophy—given one side quite widely open, the other side more or less obstructed by a spur or a deflection of the septum—the largest crusts and the worst smell come from the non-obstructed side.

There is no doubt that the paraffin method makes a decided step in advance in the treatment of ozæna, especially if, as we have reason to believe is the case, the paraffin becomes encysted when it is injected, and the procedure of Gersuny, and still more of Eckstein, will enable the rhinologist to triumph over a disease hitherto rebellious, if not incurable.

Of course, Moure intends this reference to the treatment of the three classes of cases to be no more than a mere sketch, but he introduces a few suggestions into it that are not to be passed over lightly. The first of these is his disapproval of operative measures in the purulent ozæna of adolescents. The apparent hypertrophy of the lower turbinals in these cases is in reality no more than dilatation of the sinuses of the erectile tissues, together with more or less serous and cellular infiltration of the submucosa. Nothing could be more irrational, more deplorable than the actual loss or destruction of tissue that attends the use of the snare or the galvanocautery in such conditions. As Moure says, simple cleansing and astringent treatment faithfully carried out will prove wholly sufficient to remove the swelling and inflammation in these cases, and it seems scarcely credible that anyone with the slightest conception of the functional importance of this turbinate tissue would unnecessarily destroy it when, by the exercise of a little patience, it can be restored to a state of normal usefulness.

The milder measure, the massage followed by the nitrate of silver spray, that Moure recommends, would have been well enough a year or more ago; but now that we have argyrol at our service the massage and the medicament may be combined. In other words, after the nasal fossæ have been thoroughly cleansed the whole mucous lining is to be well massaged with a 5 or 10 per cent. solution of argyrol. The penetrative power of this recently discovered silver combination is quite remarkable, and a few applications of it in this way are sufficient to check that rapid desquamation of the immature epithelial cells which is chiefly responsible for the profuse purulent secretion.

Moure's advice that only irrigations shall be used for the atrophic ozænatous coryza of children until they shall be of sufficient age to receive the interstitial injections of paraffin seems somewhat difficult of understanding. Even if we should accept the paraffin treatment as an infallible cure, which, by the way, we are scarcely yet prepared to do, would this be sufficient reason for keeping a suffering child three or four years old waiting until it is "six, eight, or ten," before employing

any other curative measure, even though it were of but comparatively trifling value? Why should we permit the atrophy, the degeneration, the absorption of this important tissue to proceed without interference, just because, after it has gone, we can fill the room it occupied with an equal bulk of paraffin? The paraffin may be made to fill an equal amount of space and to restore to the nasal fossæ their normal degree of narrowness, but functionally it is useless, and it makes but a sorry substitute for the original turbinate tissue. It is a little too soon yet to estimate accurately even its mechanical value. We can readily believe that in the cases that have thus far received this treatment the secretion has changed in character, the patient has been enabled to blow the nose, and the foul crusts have ceased to accumulate in the fossæ. But may not such improvement prove to be but temporary? When first injected into the submucosa the paraffin naturally acts as a foreign body. It is an irritant. The feeble vascular and cellular activity of the part is stimulated. Nature does her best to envelop, to encyst this mass, and during the continuance of this effort the flow of blood to the surrounding tissue is increased, the secretion becomes more fluid, there is an arrest of crust formation and a diminution or disappearance of odor. But when, at the end of a varying number of weeks or months, this result is accomplished, nature's efforts relax. The paraffin, completely shut off from the surrounding tissue by a fibrous capsule, becomes entirely inert, it loses its stimulating effect upon the vascular supply, the vessels collapse, secretion fails, and once again we have crusts and fetor. To be sure, this is a purely imaginative forecast of what may happen in these cases, but it seems to me to have enough probability about it to make it highly desirable that the atrophic process be checked as early in life as possible, long before the age at which Moure deems the paraffin injection permissible. And for this reason I think it a mistake to be content with a treatment limited to merely cleansing irrigations when there are so many remedies of considerable therapeutic activity that might be added to it.

Brindel¹ (Bordeaux) asserts that the ideal aim in the treatment of atrophic ozænatous coryza is to reduce the size of the nasal fossæ. He believes he has cured ten patients by interstitial injections of paraffin, one that does not melt at a temperature below 60° C. The injections were made in the inferior turbinates, which were very much atrophied. He injected only 2 c.c. or 3 c.c. at a time, allowing two or three days to elapse before repeating the injection. He says, what we most cordially indorse, that the time has been too short to justify a report of positive cures, but the patients were all relieved at once, and are

¹ *Presse médicale*, Paris, May 28, 1903.

apparently completely cured. Paraffin with this high melting-point hardens at once and stays where it is injected. The only inconvenience is that it is liable to harden at the tip of the needle, and a large one must be chosen on this account.

It is well that Brindel postpones for a time the claim that these few cases represent permanent cures. I have already hinted at what may happen when the primary irritating effect of the paraffin wears off, and it will be judicious to give these cases at least a year's watching before we allow ourselves to conclude that the specific treatment for this disease has at last been discovered. To believe that this purely mechanical method of treatment can be wholly and permanently curative of atrophic ozænatous coryza is to believe that the one essential cause of the disease is the abnormal patency of the nasal fossæ. No argument is needed to disprove this. It is quite evident that the excessive width of the fossæ may be responsible for the ozænatous feature of the disease, but it is equally evident that it is the consequence rather than the cause of the atrophy. Until a treatment is furnished us that will restore the nutrition and the full functional vigor of the wasted mucous membrane the use of the word "cure" will be entirely unjustified.

Surgery of the Sphenoidal Sinus. Acute and chronic inflammation and empyema of the sphenoidal sinus have been diligently studied and much discussed during the past year or more, and there has been in consequence a very great advance in our knowledge of the symptoms, the diagnostic signs, and the proper treatment of disease of this cavity. Although several routes for reaching and opening the sinus have been suggested, it is probable that the approach to it through the nose will continue to be the favorite one. It is principally with reference to matters of technique that there exists a rather wide difference of opinion among various operators.

Goris¹ describes with sufficient detail an operation of a radical character which he has performed fifteen times. Its simplicity and its comparative freedom from dangers and difficulties make it attractive. In some prefatory remarks the author mentions three conditions that especially demand surgical intervention: (1) optic perineuritis, due to extension of inflammation from the external wall of the sinus; (2) retro-bulbar abscess; (3) violent and continuous occipital pain, due to retention of pus in the sinus. His operative procedure follows:

The patient being deeply under chloroform, his head is turned toward the operator, the mouth opened widely by a suitable gag, and the operator's index finger is passed by way of the mouth and nasopharynx

¹ La Presse Otolaryngologique Belge, April, 1903.

into the posterior nares. The middle turbinate body is then removed by means of Doyen's forceps for turbinectomy, guided by the finger which also serves as a plug to prevent the blood which flows rather freely from entering the air-passages. A blunt-ended rongeur is next used to break through the anterior wall of the sphenoidal sinus, after which its inferior wall is resected with a punch forceps, still under the guidance of the finger.

A careful but thorough curetting of the sinus terminates the operation, which takes altogether but three or four minutes.

A strip of sterilized gauze is introduced within the sinus and allowed to remain for forty-eight hours. Generally there is no occasion for any after-treatment, but the application of topical remedies is now perfectly easy.

In those rare cases in which fetid suppuration persists, one of the causes is the unusual thickness of the inferior wall, which resists removal by ordinary cutting or punch forceps. In such cases the author temporarily resects one nostril and separates the soft tissues from the ethmoid, which he removes. With the aid of a good light the sinus can then be seen, and its inferior wall resected with the gouge.

There is no doubt that the comparative inaccessibility of the sphenoidal sinus has many times been responsible for the neglect or the non-recognition of its diseases. The situation of the sinus is such as to make it, when diseased, a possible focus for very serious complications. The relation of disease of this sinus to the optic nerves and to the orbit has been frequently pointed out. In the *Laryngoscope*, February, 1903, Wright says that "the involvement of the fundus of the eye in inflammatory changes is by no means uncommon in sphenoidal sinus diseases, and is usually indicative of grave cerebral complications. While the very gravest symptoms are not infrequently observed in the course of suppuration of the sphenoidal sinus which frequently results fatally, it is constantly becoming more evident that there are other less severe forms of sphenoidal sinus trouble which give rise to annoying but not necessarily dangerous symptoms. Polypi, suppurative and catarrhal sinusitis must now be considered as only partially investigated in any given case of these affections if the sphenoidal sinus is not thoroughly explored. Many an obstinate case of lateral pharyngitis, as well as the inflammation supposed to have its site in the pharyngeal tonsil, will in the future be found to depend on a vice of the sphenoidal sinus. Even if direct proof of this is at present often wanting, circumstantial evidence, especially in the form of the inexplicable obstinacy of the so-called simple post-nasal catarrh, has for many years been at hand in the experience of every rhinologist. While any distention of the sphenoidal antrum, either from neoplasm or secretion,

gives rise to much more severe cephalalgia than of the other accessory sinuses, polypoid degeneration and post-nasal dropping may be no more urgent in the affections of the sphenoid than in those of the other cavities."

The Role of the Nasopharynx in Acute Cervical Adenitis of Infancy. In the Section on Diseases of Children at the last session of the American Medical Association, Southworth (New York) presented an excellent paper entitled "Acute Suppurative Cervical Adenitis of Infancy." He stated that the great majority of these cases occurred in children under two years of age, this being due to the fact that at this period of life the lymphatic system is especially vulnerable and the lymph nodes in the cervical region particularly liable to infection and suppuration. Those who devote themselves particularly to the diseases of children are not at all unfamiliar with this disease or its etiology, but it is the general practitioner who most greatly needs the information contained in Southworth's paper, and it is a pity it was not read before the Section of General Medicine. It is the recognition of the etiology of these cases that is of supreme importance, because when this is known it clearly indicates the most valuable part of treatment—prophylaxis. With reference to the causation the author says:

"While in a few of the cases met the infection of the gland has been preceded by and is traceable to some infected cutaneous lesion, in the vast majority of the most typical cases it seems evident that they are dependent on absorption from the nasopharyngeal space. The degree of inflammation in the nasopharynx seems to bear but little relation to the occurrence of the glandular swelling, many young children suffering from acute coryza or pharyngitis of considerable severity with slight or no enlargement of the cervical glands, while in others presenting the type under consideration it is rather the rule than otherwise that there is little or no nasal involvement at the time of the attack, although careful inquiry may elicit the history of an almost forgotten coryza a week or ten days previously. We are, therefore, led to infer that pathogenic germs have been carried to the glands and have there remained quiescent, or that areas persist in the nasopharynx from which by absorption a sudden glandular inflammation of considerable intensity may be lighted up.

"It may be well for greater clearness to state that while those infectious diseases of childhood and the exanthemata which affect the mucosa of the nose and throat may often be accompanied by swellings of the cervical glands, or even by suppuration, these are not at present under consideration, nor do they present the characteristic type and course of the acute cervical adenitis of infancy.

"The usual history of the latter is that either with or without a

known antecedent attack of influenza or coryza there is the sudden appearance of a marked swelling below the angle of the jaw, which, on examination, proves to be due to palpable enlargements of a lymph gland or glands lying somewhat deeply and obliquely from behind downward and forward just below the angle of the jaw, and either chiefly anterior to or posterior to the sternocleidomastoid muscle."

The course of the disease, its diagnosis and its surgical treatment are then detailed by the author, and it was the unsatisfactory nature of the latter and the unfortunate scarring which the suppurating glands often occasioned that prompted his search for an abortive treatment. Regarding this he says :

"Some years ago attempts to discover a successful abortive treatment were begun. Ichthyol ointment in various strengths was usually unavailing. Painting with iodine gave no better results. The continuous use of the cervical ice-bag was ineffective. The various proprietary preparations of glycerin, kaolin, and antiseptics in a mass of putty-like consistency were faithfully tried, and only served to hasten suppuration like a poultice, for which purpose I now occasionally use them when abortive measures are clearly useless in the later stages. Absorption through the skin was evidently not sufficient in this region to affect the deep-lying glands.

"The connection between chronic or subacute enlargement of the lymph nodes at the angle of the jaw and catarrhal conditions in the nasopharynx dependent on the presence of adenoid masses was then brought to my notice by the writing of Dr. Joseph Huber. The nasopharynx, owing, perhaps, to its situation and construction, has been accorded rather more than the usual neglect shown cavities whose interiors do not lend themselves easily to direct inspection. It seems to be only of comparatively recent date, despite the intimate connection between the condition of the mucosa of the nasopharynx and the integrity of the Eustachian tube and the middle ear, that treatment of inflammations of the respiratory tract has been directed with any degree of regularity to this most resistant seat of catarrhal trouble, which, especially if adenoid masses are present with their deep sulci, affords an ideal opportunity for the retention and absorption of septic material. It is to Jacobi and Caillé that we owe, in this country most especially, the earnest recommendation of the nasal and post-nasal toilet for children, but only in the infectious diseases has this teaching taken root in general practice.

"The connection between inflammatory conditions of the nasopharyngeal space and acute infections of the glands at the angle of the jaw once in mind it seemed probable that if promptly after the lighting up of the primary inflammation of the gland as evidenced by its en-

largement, further absorption of infectious matter from the nasopharynx could be prevented, the gland might be able to cope successfully with the initial invasion, and resolution occur, but that if fresh invasions were allowed to take place resistance would be overcome and the gland would break down. Attention was, therefore, at once directed to the problem of limiting septic absorption from the nasopharynx by measures which would keep the mucous membrane clean and also restore it as soon as possible to a normal condition. The plan adopted was as follows: when fever was present tablets were given containing:

R.—Tinct. aconiti,
Tinct. belladon. aa ½ ℥.
Camphor ʒv gr.

Sig.—One-half to one tablet, according to age, every two hours.

“Chlorate of potash has an almost specific action in limiting the pharyngeal inflammations of childhood, therefore:

R.—Potassi chloratis grs. i-ij.

Sig.—Every two hours for twenty-four hours, then every three hours, and later every four hours.

“To cleanse and soothe the nasopharynx:

R.—Tablets alkaline antiseptic (Seiler).

Sig.—Dissolve one in half glass of water and pour a little with a teaspoon into each nostril every three hours.

“The results obtained from the institution of this line of treatment were immediately most gratifying, and a period of over one year during which these abortive measures were successful in producing resolution in every case would have made rather too favorable a report to be credited. I have, therefore, withheld it until the series has been broken by a few failures (four in number) which under careful observation have in themselves proved most instructive.”

Surely nothing could be more convincing as to the causative connection between the catarrhal affections of the nasopharynx and this variety of cervical adenitis than the testimony here given. And it is the spreading of this gospel of nasal and nasopharyngeal cleanliness that will hasten the coming of the day when the use of a proper wash in the atomizer or hand douche will be as systematic and universal as is now the use of the toothbrush.

Prolonged Intubation. In the *Journal of the American Medical Association*, July 11, 1903, an important paper by B. R. Shurley concerns the causes of prolonged intubation and retained tubes. There can be little doubt that in the large majority of cases traumatism inflicted either during intubation or extubation is responsible for the necessity to introduce the tube and to retain it for long periods.

While this injury to the laryngeal tissues has been occasioned at times by the forced introduction of too large a tube, yet much more often it has been attributable to the roughness or the lack of skill on the part of the operator. The frequency of the first of these causes can be diminished by the operator having at his command a large supply of tubes from which to make his selection, and it need scarcely be suggested that it will be much better to err on the side of using too small a tube and having it promptly coughed out than to attempt to overcome by force the laryngeal resistance to too large a size.

If after extubation there should be a reappearance of the dyspnoea, due to production of the pseudomembrane, it should be an invariable rule to resume at once the administration of antitoxin and to employ at least 2000 units. Should a return of the dyspnoea be occasioned by a complicating abductor paralysis of the cords, the vigorous employment of strychnine naturally suggests itself. Finally, it is in those cases of prolonged intubation that are due to ulceration and granulation following traumatism that the author urges the more extensive use of direct medication to the larynx. The method of effecting this by anointing the tube with ointments containing alum, ichthyol, argyrol or resorcin is, of course, not new, but it is deserving of much wider adoption.

The final statement in the summary which concludes Shurley's paper is that "tracheotomy is never indicated." Exception may, perhaps, be taken to so dogmatic an assertion, but it is certainly true that this operation is too often performed when there is neither necessity nor excuse for it.

In the *Medical Record*, August 1, 1903, there is a paper by Henry W. Berg entitled "Chronic Postdiphtheritic Laryngeal Stenosis as a Cause of Persistent Intubation of the Larynx." He bases his study upon the cases that occurred in the Willard Parker Hospital between January 1, 1901, and April 1, 1903. Among these the total number of intubation cases was 578; the total number of recoveries 221, and the number of persistent tube cases 17. Three of these latter patients left the hospital to receive treatment elsewhere. Of the 14 cases remaining at the hospital, he reports that 5 have died, 7 have been discharged as cured, and 2 are still under treatment. These comprise his statistics. In speaking of the instruments to be employed for intubation, the author insists that none but the properly constructed O'Dwyer tubes and accessories are suitable. He asserts, indeed, that some of the so-called improvements make the modified tubes positively dangerous, and he gives excellent reasons for this statement. He thinks that for purposes of study and comparison cases requiring prolonged intubation are best divided into three classes: 1. Cases of pro-

longed stenosis in which the original conditions which necessitated the intubation persist beyond the usual length of time. Such cases are best classified as *protracted* cases. 2. Cases of prolonged stenosis due to pathological changes which have arisen during or subsequent to the primary intubation and are not those of the diphtheritic process which demanded the primary intubation. Such lesions may be due (a) to the injurious effect of the tube upon the structures of the larynx or trachea; (b) to traumatism inflicted by the operator either during intubation or extubation. 3. Cases of persistent intubation due to paralysis of the vocal cords; (a) temporary paralysis or spasm; (b) persistent paralysis. The cases that are included in the second and third divisions are those that the author studies particularly, and which he thinks it proper to designate as *persistent* tube cases. The period during which the tube was retained in these cases varied from two and a half months in the shortest case to eighteen months in the longest.

The causes which Berg regards as being most frequently active in necessitating persistent intubation are: 1. "Pressure sores," or, as the Germans call them, "decubitus." Although these lesions may, and often do, undergo cicatrization without any objectionable sequelæ, yet now and then upon the performance of extubation decubitus may provoke such an amount of swelling of the surrounding tissues as will occasion stenosis. This, of course, is only to be remedied by a reintubation, and this repetition of the operation inducing further irritation of the ulcerated areas, a later extubation will be followed by an even more marked obstructive swelling which without still another intubation would result in asphyxia. Such an irritative hyperæmia as is provoked and maintained by this repeated extraction and reintroduction of the tube will inevitably lead sooner or later to the formation of cicatricial tissue, and the subsequent organization and contraction of this will result in a permanent stenosis. The size of the tubes employed in such cases must be steadily reduced with the progress of the contraction, and eventually more or less complete atresia may be confidently looked for. A similar result may be brought about by the contact and adhesion of two opposing sores. There are, unfortunately, no early symptoms which positively denote the existence of these pressure sores. It is, as a rule, only when their consequences become apparent that the attendant's suspicions are aroused and the diagnosis made. There is one symptom, however, which should always lead to an investigation and the discovery of the lesion, and this is the occurrence of late auto-extubation after a number of intubations. 2. Berg regards as the next most frequent cause the stenosis following traumatism inflicted by the operator. This may occur either during the introduction or the removal of the tube. Such injuries even when extensive may at times heal

quite readily, whereas at others slight abrasions may prove sufficient to occasion a serious chronic stenosis. It is not difficult to anticipate the author's statement that the chief causes of such traumatism are (a) improper modifications of O'Dwyer's instrument, and (b) lack of skill on the part of the operator. 3. The third and final cause of persistent intubation is paralysis of the vocal cords, this being usually the result of pressure. The prognosis in any of these cases is influenced by the cause of the stenosis and by the stage and degree of it. In the cases of *protracted* intubation the prognosis is usually favorable, and of those of *persistent* intubation due to stenosis about 60 per cent. are curable. The stenosis dependent upon abductor paralysis of the vocal cords is of unfavorable prognosis.

Direct Inspection and Treatment of the Air-passages by the Kirstein Method. In the October, 1904, issue of the *Journal of Laryngology, Rhinology, and Otology*, Killian gives a series of suggestions concerning the best means of carrying out the Kirstein method of direct examination of the larynx, trachea, bronchi, and œsophagus. The paper is illustrated by photographs showing not only the patient in the various positions that most facilitate the examination, but also the operator with his instruments *in situ*. It is scarcely surprising that this species of surgical sleight-of-hand is rather slow of general adoption. It is not to be denied that it may be of very great assistance in a certain number of cases, but the number is small; they may occur only at very long intervals, and when they do occur they are apt to be of such an exigent nature as not to permit of the expenditure of time necessary to bring to the scene of action all the instrumental and illuminating paraphernalia that this method demands. It may have its legitimate and most satisfactory application to the removal of certain tracheal growths, generally sarcomata, but it is not often that foreign bodies in the respiratory passages will wait any longer for relief than is needed to perform a low tracheotomy. And now that radiography has been added to the ordinary means of examination, the cases have become even fewer in which direct inspection of these passages is essential either to diagnosis or to treatment. Killian, however, has certainly done some wonderful things by this Kirstein method, and we cannot withhold our admiration, even though we do not predict a general adoption of it. One of the two cases reported by Wild¹ borders on the miraculous. Upon a child aged six years, under chloroform narcosis, bronchoscopy was performed, and not only was a bean discovered in one of the tubes, but in spite of its being impacted and partially concealed by a ring of swollen mucosa above it, suitable forceps were passed

¹ Arch f. Laryng., Band xii., Heft 2.

down to it and it was grasped under the control of vision and removed by the mouth. This is simply an instance of what may be accomplished by extraordinary manipulative skill, and it is because the opportunities for acquiring such skill are so rare that we cannot look forward to any widespread popularity for this procedure.

The Operative Treatment of Malignant Disease of the Larynx.

At last, after many years of impatient waiting, we are approaching something like scientific accuracy in our estimate of the methods at our disposal for the operative treatment of malignant diseases of the larynx. In the first place, clinical observation coupled with pathological demonstration have gradually so added to our knowledge of the course of laryngeal cancer, almost from its beginning, its laryngoscopic appearances at different stages, and its subjective and objective symptoms, that we are to-day infinitely better prepared to make not only an almost positive diagnosis but an *early* diagnosis than we were twenty or even ten years ago. And it is to this greatly increased diagnostic ability that we are mainly indebted for the something like order in our ideas of treatment that has been slowly emerging from the chaos of a few years back. Possibly to Semon more than to anyone else we are under obligations for the stop that has been put to the statistical juggling that has bewildered and misled us ever since the relative value of the several external laryngeal operations was first studied in this way. It is only since his keen scrutiny of the comparative statistics of these operations and his exposure of their fallacies and the false conclusions into which they could be manipulated to lead us that our own eyes have been opened and our own judgments have become qualified to protect us from error. The utter absurdity of damning a certain operation because of the superficial showing of a statistical table that includes every such operation ever performed, without any reference to the stage or extent of the disease or the diagnostic or surgical ability of the operator, is now so universally recognized that we are no longer in danger of deception by the trickery of such figures.

In the Section of Laryngology and Otology at the seventy-first annual meeting of the British Medical Association, Semon's introductory remarks in the discussion of the "Operative Treatment of Malignant Disease of the Larynx" constituted an unprejudiced and most valuable review of the progress of laryngeal surgery up to the present time. His well-known advocacy of the operation of thyrotomy for malignant disease was supported and, within certain limits, justified not only by an analytical study of statistics, but by a review of his own cases, the results in which have been astonishingly successful. Following him Professor Gluck, of Berlin, presented the claims of laryngectomy, partial or complete, as the operation of election. Upon the completion

of Semon's paper it seems as though the impartial listener could scarcely have resisted a prompt and complete acceptance of his opinions and the adoption of thyrotomy as the one operation in these cases that could command unqualified approval and trust. And yet, upon hearing within the same hour the description of Gluck's laryngectomies and the really marvellous results that attended them we find ourselves for a moment again the sport of indecision and bewildered by the almost equal attractiveness of the two operations. It requires a critical reading and study of both papers and an unhurried digestion of all the facts contained in each to enable us to draw conclusions that will not be apt to undergo repeated alteration. There are a certain few deductions, however, that almost stare us in the face, and of these the first is that neither of these operations should be undertaken by one who is possessed of only a commonplace amount of surgical knowledge and skill. Whether we operate by the intralaryngeal or the extralaryngeal route, it is only by the utmost refinement of technique that we can hope to offset the adverse influence of the extraordinary surgical difficulties that beset this organ. Until within the last few years the discouraging, indeed, the appalling results of almost all the operations for laryngeal cancer were largely attributed to the crudities of method that characterized each. The distressing mortality in these earlier operations was almost wholly due to the pulmonary complications that resulted from the entrance of blood into the lungs during the progress of the operation, and afterward of septic matter from the wound. To those who have not read Semon's address, a review and discussion of its main points will be of exceptional interest and value. The subject is much too important a one and the paper too authoritative and complete to permit of its being reduced within the limits of the conventional abstract.

After a preliminary reference to the experiments of Czerny upon dogs, in 1870, as marking the beginning of laryngeal surgery, he briefly reviews its pathetic history during the succeeding eighteen years, bringing it down to the illness of Frederick, the then Crown Prince of Germany. It was the disease of this royal larynx and the discussions connected with it which led to a considerable improvement both in the diagnosis and in the operative treatment of malignant disease of this organ. Shortly afterward, in 1889, Mr. Butlin demonstrated that owing to diagnostic advancement thyrotomy deserved to be reinstated in the place from which, as the result of defective diagnostic knowledge and imperfect execution, it had been removed. Although I cannot do more than merely refer to the ensuing two or more pages in which Semon demolished the pretensions of carelessly compiled statistics, they are extremely well worth reading in full.

Of the five different operative methods of dealing with malignant disease of the larynx, he says that "inasmuch as no internal medication of any kind has as yet enabled us to cope with that terrible disease, the only questions to decide in such circumstances are: When shall we operate, and what method shall we select?" There will probably be few to dispute the wisdom of the principle that he would establish, that "operation should be at once proceeded with if the case lends itself at all to operative interference, as soon as the diagnosis is made." He laments that not only the general public, but a not inconsiderable proportion of the medical profession itself, are still possessed by the idea, "once cancer, always cancer," and he thinks that "if anything could be calculated to rouse these skeptics from their present pessimistic attitude, surely it ought to be the brilliant results which are now obtained in cancer of the larynx when the diagnosis has been made early, the suitable operation selected, and no precious time has been lost." He insists, and with excellent reason, that the dictum of Virchow, "If cancer be at its onset and often for a long time a local disease, it must be possible to cure it at that stage by local treatment," should be our guidance in this whole question. He draws very sharply the line between intrinsic and extrinsic cancer of the larynx, and calls attention to the fact that the distinction between them, from a practical point of view, is an all-important one. Thus, "The intrinsic form remains much longer a purely local affection, and shows very little tendency, until the disease is much advanced, to infect the neighboring lymphatic glands; whereas, in the extrinsic form such glandular infection unfortunately makes its appearance, as a rule, at a very early stage. Upon this one fact depends the enormous difference between the two forms with regard to prognosis, extent, and danger of the operation, and probability or otherwise of recurrence, and it is likely that this difference will ever continue to exist as long as we are compelled to combat the disease by operation; but whether extrinsic or intrinsic, under *all* circumstances must it be our aim to establish the diagnosis as early as possible, and when it is secured, or even in a few cases when it is somewhat doubtful, to proceed energetically." In very few diseases does he think the question of time is of such paramount importance, and "in very few does the loss of precious time revenge itself so cruelly as in malignant disease of the larynx."

In considering the relative value of the different operations, he begins with the intralaryngeal method, and this, it is scarcely necessary to say to those familiar with his tilt with Fränkel, in 1889, he still unqualifiedly and vigorously condemns. He does not deny that it may and has in a number of cases accomplished most gratifying results, but he regards these as exceptional in every way, and wishes it understood

that he is dealing not with the brilliant exceptions, such as these, but with the general operative principle in cancerous disease which demands thoroughness of removal. In order that the operation may be thorough and really deserve to be termed radical, it must include the removal not only of the cancerous tumor itself, but of a sufficient area of healthy tissue in all directions around and beneath it. Naturally, even a surgical wizard could scarcely guarantee such completeness of removal when operating by this method. It is for this reason, Semon argues, that this method should be restricted to the removal of wholly superficial and, therefore, benign growths. This is its limited and legitimate field, and it should not attempt to encroach upon any other. In this connection attention is drawn to the fact that the information given by the laryngoscope as to the actual extent of disease present is very incomplete, and, therefore, apt to be deceptive. It has almost invariably been Semon's experience that upon opening the larynx by external operation he has found the disease much more advanced than he had been led to believe by the laryngoscopical inspection. He disposes of the advantages that are claimed for the internal operation by saying that they are more than offset by "the dangers which loss of precious time and undue postponement of really radical operation bring about."

It will be extremely pertinent just here to introduce a portion of one of Jonathan Wright's contributions to the *Laryngoscope*, February, 1903, under the title "Some Critical and Desultory Remarks in Recent Laryngological and Rhinological Literature." Anything from this author's pen is not only invariably delightful reading, but is always replete with sound sense and clear judgment. Nothing could be more apropos at this place than the extract which follows and which defies any attempt at abridgment:

"It is probable that in this country and in England we have accepted a little too absolutely the dicta of those who operate by extralaryngeal methods for laryngeal cancer, if the case is an operable one at all. The statistics of late, adduced from time to time by the expenditure of much ingenuity, show considerable advance in so-called cures over those of twenty years ago, yet at the best they are melancholy reading. It would be amply sufficient to remind us of the impotency of our art in the fight against cancer even were we to forget, as we sometimes do, the inoperable cases which are not reported at all. After all, cancer is, at least in its manifestations, at first a local disease, and if it is so localized at the edge of a vocal cord, or otherwise projects from a surface within the larynx, which it does not infiltrate, the statement that it may be eradicated by endolaryngeal forceps does not outrage our common sense as not being within the range of possibilities.

“ Arslan¹ summarizes the reports of successful endolaryngeal operations, sixteen in all, and adds two of his own. To have freed eighteen patients of carcinoma of the larynx by endolaryngeal methods is no small triumph, while freedom from recurrence of the disease, in some cases lasting for twenty years, can hardly be surpassed in the annals of the extralaryngeal operation. We must agree, therefore, that this endolaryngeal operation is more than indicated in certain cases, but it is impossible to believe that it can be successful where the infiltration extends beyond the superficial tissues. Now the important point is that by endolaryngeal inspection alone, neither before nor at the time of operation, can the degree of that infiltration be ascertained. During the course of the extralaryngeal operation, both by direct inspection and by palpation, a degree of information as to the infiltration may be reached and advantage taken of it, which is manifestly impossible in the endolaryngeal operation. On the other hand, as with intubation in diphtheria, almost every case will promptly submit to an endolaryngeal operation at an early stage, while many a case will delay or refuse the extralaryngeal operation at a time when the prognosis is not yet entirely hopeless. In the face of the facts submitted by Arslan, indisposed as we may be to allow the admissibility of endolaryngeal methods in many cases where laryngotomy is indicated, we cannot but believe that each procedure has its own field, however much those fields may overlap and give rise to individual choice. The results attained by endolaryngeal methods are not necessarily incompatible with what we know of epithelial cancer, but the operator can necessarily *never* feel that assurance that the whole of the growth has been removed, while with laryngotomy such confidence is more frequently warranted. The cases of Fränkel and Schmidt have demonstrated that recurrence does not always defeat the ultimate result, but that subsequent operations are occasionally able to retrieve the failure of the primary intervention.

“ Arslan might very properly have drawn attention to a point that is usually ignored in the statistical reports of the results of operation for endolaryngeal cancer, and that is the degrees of malignity in epitheliomata. Perhaps not in the larynx, but it is an undoubted fact that the phenomenon is occasionally observed of a benign clinical course in growths which bear every microscopic evidence of malignity. Now, when we arrive at the very small percentage of so-called cures and remember that these percentages are only made up from selected cases, we cannot but question how much operation really had to do with the results. When we know that a very large proportion of the cases of

¹ Archivio Italiano di Otologia, 1901, vol. xii. fasc. 2.

laryngeal cancer we see are at once dismissed as inoperable, and when we consider that these cases are, *par excellence*, those among which are found the highly malignant growths, while the so-called operable cases are presumably those among which the feebly malignant growths are apt to be found, this query assumes a very debatable aspect, and even the ground still taken by some that every laryngeal cancer is inoperable seems to assume a more rational appearance. The author, however, fails to place this matter in its proper light, though he, as do all others, remarks upon the favorable location of intralaryngeal growths for prompt recognition, and for, at least, the temporary limitation of its infiltration. Besides the favorable location of the growth, the toleration of the patient, and especially the manual dexterity of the operator are the most important factors in the successful eradication of the laryngeal growth. This manual dexterity, I am sure, is not so great among the younger laryngologists as was possessed by those who had experience with the more numerous instances of benign growths which appeared in the clinics and offices of the early laryngologists. Notwithstanding the fact that very many of us in the large cities see yearly more than a thousand larynges, very few of us ever operate in a year on more than a half dozen endolaryngeal growths, while the average, I fancy, is much less than this. It is no more than frankness, therefore, to admit that few of us possess the requisite dexterity to extirpate anything more than a superficial or pedunculated growth without dangerous mutilation of intralaryngeal structure. The dangers of the extralaryngeal operation itself and the loss of voice, it is hardly necessary to dwell on here as weighing against the method. They are sufficiently appreciated by all.

"Mention may be made of a report of two cases operated on in England by Yonge, and reported in the *Lancet*, November 15, 1902, in which the extirpation was extralaryngeal by means of a thyrotomy. The result as to voice and non-recurrence fully equals the two reported by Arslan, and they form a good counterfoil to his argument for the endolaryngeal method.

"In the *Rev. hebdomadaire de laryngologie*, 1901, No. 43, E. Kraus, of Paris, relates the history of a case of laryngeal cancer extending over five years. The patient died of an intercurrent affection at the age of eighty-four years. During this period, while subjected to considerable pain, loss of voice and annoyance, and the necessity for a time of wearing a tracheotomy tube, his days were spent, on the whole, with fair amount of comfort. The histories of three cases of laryngeal cancer occur to me, two seen very recently in which that period has been equalled, and the patients are still alive and fairly comfortable. The other case was seen a few years ago. Nothing like a radical

operation was done in either case, but in all of them various incomplete internal procedures with cautery and forceps and caustic applications had been carried out by the physicians with whom I saw the cases in consultation.

"Now, while thus far, I am of the opinion that an early, extensive and radical operation is indicated in almost every case of incipient intralaryngeal cancer, it must be admitted in a spirit of fairness, which should govern the discussion of every such question, that results such as these obtained in the radical operation would be paraded by its advocates as instances of the triumph of modern laryngeal surgery. I am sure even those of us who lean toward the advisability of even total laryngectomy in selected cases will readily agree with those who still cling to the "*laissez faire*" policy, that much more time must elapse before a proper judgment can be rendered from a study of the cases which have lately been reported. An insurance of five years of endurable life from the incipency of such cases is a proposition from which the most sanguine surgeon would naturally recede in even the most promising of cases. For this is a limit which, while it has been exceeded, would reduce the number of cases attaining it to a comparatively insignificant number."

When speaking of *thyrotomy* we expect Semon to grow eloquent, and he does not disappoint us. He asserts that "it is indicated in all cases of intrinsic malignant disease of the larynx in which the diagnosis is made at a time when the disease is not too extensive nor apparently too deeply infiltrating. I firmly believe that in such circumstances thyrotomy and thorough removal of the growth with a sufficient circumference of healthy tissue, and accompanied, as individual cases may require, by removal of small fragments of cartilage in the neighborhood, is a positively ideal operation." Of the twenty thyrotomies that he has performed in cases of microscopically demonstrated malignant disease of the larynx he has had nineteen recoveries with but two quite doubtful recurrences, and one death from the operation. Between June 2, 1901, and July 29, 1902, he operated upon eighteen cases of laryngeal cancer, and of these fifteen—*i. e.*, 85 per cent.—are now alive and well. In order to obtain such results as these he insists that the following conditions are absolutely essential:

"1. The operation must be restricted to early stages of intrinsic malignant disease.

"2. For this purpose an early diagnosis is indispensable.

"3. The operation when performed must be thorough—*i. e.*, no sentimental considerations concerning the amount of vocal power to be retained by the patient must interfere with the imperative necessity of removing a sufficient area of healthy tissue around the new-growth in

all directions. A violation of this rule on one single part of the periphery of the new-growth may frustrate the entire purpose of the operation.

"4. Should it be found after opening the larynx that the disease is more advanced than it appeared from laryngoscopical examination, it is the duty of the operator not to limit his interference to the operation originally contemplated, but to perform partial laryngectomy or, indeed, any other operation, the necessity of which may become apparent when the extent and depth of the infiltration of the new-growth has been definitely ascertained."

His operative technique is practically unchanged from that which he described in the *Lancet* in 1894. After experimenting for a time with immediate complete closure of the wound, he has abandoned it and returned to his original custom of leaving the lower part of the wound open for two or three days after the operation until all danger of septic complication has passed. One addition he has made, and this is that "in cases in which the growth was situated in the anterior commissure, and in which it was necessary to remove the anterior parts of one or both vocal cords, I have recently repeatedly stitched their posterior ends to the ventricular bands, with the effect of obtaining much better vocal results than had resulted without this procedure."

Of the operations of partial and total extirpation of the larynx Semon speaks very briefly; but he makes it perfectly clear that he entirely approves of them in those cases in which the disease has passed beyond the point within which thyrotomy would have been sufficient, as well as in those other instances "in which the disease begins in a situation which, *a priori*, renders it impossible to eradicate it by less heroic means, such as in the posterior wall or in the œsophageal aspect of the larynx." He feels sure, however, that in view of the incontestable fact that intrinsic malignant disease is undoubtedly far more frequent than extrinsic, it may confidently be hoped that by an earlier recognition and thorough extirpation by means of thyrotomy of the former variety the number of cases of total extirpation may become more reduced in number as years pass on.

Subhyoid pharyngotomy he quickly dismisses as being suitable only to the few cases in which the disease is limited to the epiglottis or to the arytenoepiglottidean fold.

The address of Professor T. Gluck (Berlin), which immediately followed that of Semon, was not argumentative in any other sense than in the favorable effect produced by the plain statement of his operations and their results. Nothing could have been more impressive with regard to the bright future of laryngeal surgery than his simple and unpretentious recital of what he had been able to accomplish in a large

number of what to all appearances were most desperate cases. His results would compel our admiration even had they been gained in cases in which the disease was of comparatively recent origin; but no timid regard for his statistics seems to have deterred him from undertaking the operative relief of even the most advanced and apparently hopeless cases. He attributed much of his success to the improvements in technique which were the developments of the past few years, and of these he regarded as the most valuable the prophylactic resection of the trachea and its suturing to a buttonhole opening made in the skin of the throat. It is this that prevents the bronchopneumonia which results from the entrance into the lungs of blood during the operation, or of septic matter from the wound subsequent to it. This interposition of a living organic barrier between the lungs and the wound represents the fundamental and original idea of all modern prophylactic methods of performing this particular group of operations. This and certain other minor points of technique enabled him to say that "early external operations for intrinsic laryngeal cancer are attended with as good and, perhaps, better results than any operations for malignant growths in any other part of the body," and he wished that this consoling conviction might become universally known.

His references to the difficulties of diagnosis and the frequent surprises as to the extent of the disease that attended the opening of the larynx were entirely in accord with those of Semon. He spoke, also, of the ordinary dangers and complications of the major laryngeal operations, but asserted that diabetes, cardiac disease, and advanced age did not constitute absolute contraindications to their performance. It is needless to give here a detailed account of his many operations and the brilliant results that he achieved, but a brief summary of one or two of his series should be recorded. From among one series of twenty-two cases of total extirpation of the larynx there had been only one death—that occurring on the eleventh day, from iodoform poisoning, in a man aged seventy years. In another group of twenty-seven cases of transverse extirpation of the larynx and pharynx, in the majority of which infected glands were also removed, there had been again but one death, and that was on the fifth day after the operation in which ligation of the carotid was followed by lateral hemiplegia and unconsciousness. The brilliancy of the surgical progress could be gathered from the fact that out of a former series of nine cases there had been four deaths, and that from his first ten operations—dating back to 1888—there had been but two recoveries.

In conclusion, Professor Gluck said, what his results amply proved, that the operation prolonged life and renewed hope; and if after a year or eighteen months relapses occurred in the desperate cases then,

according to his experience, the operation rendered the last stage less painful and death more peaceful. On the other hand, as regards the patients who recovered, their relations said they had lived contentedly, and in some cases merrily, until a relapse brought death rapidly.

After a careful study of these two papers, of the opinions of their respective authors, of their reasons therefor, and of the results attained by each, it seems as though there should be no excuse for any great diversity of opinion as to the conclusions to be drawn. There will certainly be, for instance, an entire unanimity on one point—that the man who proposes to operate on the larynx should be possessed not only of an accurate anatomical knowledge of the region involved, but that he should be a master of surgical technique, and have acquired unusual manual skill. These being admitted to be absolute essentials, the choice of operation will be determined very largely, if not almost exclusively, by the situation and the stage of the disease. To suppose a case: if in an elderly person a neoplasm is found upon a vocal cord, the appearances of which and the age of the patient make us strongly suspect as being of a cancerous nature, but which is still apparently quite superficial and unattended by any discoverable infiltration of the tissue from which it springs, to which of the several operative procedures shall we resort? I cannot believe that any one of those who have read the utterances of Semon and Gluck would be guilty of inaction and mere temporizing. From an operative point of view, that which would be comparatively simple and, in all probability, permanently successful now, might become extremely formidable and of doubtful result through a single month of procrastination. Some of us, however, with conservative leanings, and especially with the alluring results obtained by Arslan before our eyes, might be tempted to select the internal method of removal, and to found our hopes of success upon the patient's guardian angel or upon the known small percentage of malignant growths that pursue a benign course for an indefinite period. Such a decision might not be, strictly speaking, censurable, but in the light of these recent teachings the sentiment that prompts such a choice would deserve to be regarded as timidity rather than conservatism. Should it be the patient himself who is opposed to an external operation, and, yielding to his wishes, we adopt the internal method, let it only be upon the positive condition that should the microscope prove the growth to be malignant, he will submit with the least possible loss of time to whatever secondary operation may be necessary to make the removal radical. Surely it is to just such cases as this that thyrotomy is particularly adapted, and in which, as Semon justly claims, the results obtained are "perfectly ideal." I think we may reasonably hope that with further experience and a grouping of

the results obtained from comparative studies of benign and malignant laryngeal growths by different observers, we may be enabled to make a trustworthy diagnosis between the two at a much earlier period than has hitherto been possible. Should this hope be realized the cases that are now allowed to pass unrecognized beyond the stage at which thyrotomy would be thoroughly radical will become rapidly fewer, and the much more formidable operation of laryngectomy will be limited to the small but unavoidable number who have either failed to seek advice in time or who have had the misfortune to fall into incompetent hands.

Tuberculosis of the Larynx and Tonsils. Tuberculous disease of the upper air-passages continues to be the object of much laboratory and clinical study ; but in spite of the gratifying results that have been often obtained by the local treatment of this disease when affecting the throat, the general practitioner is still disposed to regard it as hopeless and to content himself with the administration of morphine or some of the local anæsthetics.

Kronenberg, in the *Münchener med. Wochenschrift*, No. 16, deplors the fact that physicians do not examine the larynx for tuberculous lesions as a routine measure in all persons suspected of tuberculosis. As a consequence of the neglect of this precaution, the laryngeal lesions are frequently beyond control when they are at last looked for and discovered. It is unfortunate from one point of view that tuberculous laryngitis often fails to occasion any painful or otherwise disturbing symptoms until the disease is far advanced. He advocates the surgical treatment of this disease whenever, with good general condition, there is a certainty or probability of removing the entire focus. Laryngotomy is only indicated in very exceptional cases. The standard procedure is by way of the mouth. If complete ablation is impossible, he would operate only on the lines indicated by threatening complications or to eliminate what interferes with other therapeutic measures. None of the remedies recommended for the purpose has a specific action ; galvanocauterization is the most effectual yet known. The physician's greatest effort should be to secure spontaneous healing. This is best accomplished by careful general treatment along approved lines to enhance the natural resisting powers of the organism, supplemented by local treatment. Unfortunately, he remarks, the majority of patients who suffer from laryngeal tuberculosis are poor, and they can seldom enjoy the physical and dietetic measures required. Curable cases, he thinks, should be sent to a sanatorium or its equivalent. He has witnessed a few cases in which a moderately severe tuberculosis of the lungs and larynx healed completely in time.

Kronenberg's last suggestion, that curable cases should be sent to a sanatorium, was made by myself some three years ago in a paper

dealing with laryngeal tuberculosis, and read before the Kings County Medical Society of Brooklyn. It was urged that the customary every second or third day treatment of these cases was absurdly insufficient, and that it was the veriest folly to hope to cure or check this disease by such far apart treatments. When ulceration has begun and the larynx is filled not only with the mucopurulent secretion from its own walls, but with that also from the lower air-passages, it is out of the question to expect to secure cicatrization with fewer than two thorough treatments in each twenty-four hours. It is extremely seldom that it would be practicable for the specialist to carry these out at his office, and, even if it were, there are very few of these patients who would be able to come to him so often. It was for this and a few other reasons that the sanatorium was suggested, in which the diseased larynx could be thoroughly cleansed and medicated twice daily, and without any exposure or fatigue on the part of the patient.

LARYNGEAL TUBERCULOSIS DURING PREGNANCY. Loehenberg¹ has observed five cases of pregnancy complicated by laryngeal tuberculosis. He suspects the condition to be more common than is generally supposed, believing, in fact, that pregnancy in a tuberculous woman predisposes her to laryngeal tuberculosis, and even in healthy pregnant women the larynx is more likely to be the starting-point of the disease than any other organ. The slightest hoarseness during pregnancy should be followed by a most careful examination of the larynx, and if the diagnosis be doubtful the examination should be frequently repeated. On account of the very fatal prognosis to mother and child which is accorded the disease by all observers, the author recommends the prevention of marriage of tuberculous people, the prevention of conception after marriage, the prompt diagnosis of laryngeal disturbances during pregnancy, and removal to the most favorable surroundings if tuberculous laryngitis be recognized. Of his patients, the first was delivered prematurely; mother and child died about the fourteenth day. The second patient died six weeks after delivery, the child being apparently in the best of health. Both these patients were seemingly very well prior to pregnancy, the larynx being the primary seat of infection, and extension subsequently occurring to the lungs. The other three patients had pulmonary tuberculosis, and developed the laryngeal complication during pregnancy. Of these three, the mothers and two of the children died.

With such a record of fatalities as this to both mother and children, it seems as though the author would have been justified in adding a fifth recommendation to the four that he gives—that the womb be

¹ Münchener med. Wochenschrift, February 24, 1903.

emptied immediately upon the discovery of tuberculous infection of the larynx. We know that the child would probably die anyhow, and this procedure will give the mother her one fighting chance for life.

TREATMENT OF LARYNGEAL TUBERCULOSIS. Grünwald¹ reports cures of tuberculosis of the larynx by means of the repeated application of the fine point of the galvanocautery for from five to ten seconds at a time. By this method the deep underlying infiltration is reached without destruction of any of the overlying mucous membrane. In one case the existing dysphagia disappeared almost at once. The treatment is strongly advocated by the author, who believes that many cases would be vastly benefited by it.

This is another of the semisurgical procedures which demand careful discrimination in their employment. Its success will largely depend upon the extent of the disease, the degree of vitality of the patient, and, it goes without saying, the skill of the operator.

Castex recommends in the treatment of laryngeal tuberculosis that hot flannel binders be applied to the neck and removed frequently during the first stage of the disease. The laryngeal mucous membrane may be sprayed with one of the following solutions :

| | |
|--------------------------------------|-------------|
| R.—Sodii benzoatis | gr. xiv. |
| Aquæ destil. | ℥ ij.—M. |
| Sig.—As a spray ; or, | |
| R.—Acidi carbol. | gr. xv. |
| Glycerini, | |
| Aquæ destil. | aa ℥ ij.—M. |
| Sig.—As a spray ; or, | |
| R.—Menthol | gr. xv. |
| Gomenol | ℥ iiss. |
| Alcoholis | ℥ ij. |
| Aquæ destil. | ℥ v.—M. |
| Sig.—Apply locally as a spray. | |
| (Gomenol is a terpinol preparation.) | |

He recommends that the treatment of the larynx be repeated two or three times a day. In the third stage the following is recommended :

| | |
|--|----------|
| R.—Cocainæ hydrochlor. | gr. xxx. |
| Morphinæ hydrochlor. | gr. xv. |
| Antipyridini | ℥ iiss. |
| Glycerini (neutral) | ℥ ij.—M. |
| Sig.—One teaspoonful added to half a glass of distilled water, and used as a gargle. | |

Solis Cohen recommends the following combination :

| | |
|----------------------|-------------|
| R.—Orthoform, | |
| Anæsthesin | aa ℥ j. |
| Ext. suprarenalis, | |
| Iodoformi | aa ℥ ij.—M. |

Sig.—To be insufflated into the larynx, especially when painful ulcerations are present.

¹ Münchener med. Wochenschrift, June 23, 1903.

And topically he advises the following :

| | |
|-----------------------|---------|
| R.—Guaiacol | 3 ijas. |
| Menthol | 3j. |
| Olei | 3vj.—M. |

Sig.—Apply locally after an application of cocaine.

THE TONSILS AS PORTALS OF INFECTION. At the meeting of the Congress of American Physicians held in Washington, May, 1903, Koplik (New York) in a paper entitled "Tuberculosis of the Tonsils, and the Tonsils as Portals of Tuberculous Infection," called attention to the work of Cohnheim, Orth, Strassman, Schlanker, and Kruckmann in this connection, and thought the cases might be divided into those observed clinically and those in which post-mortem examinations had been made. Primary tuberculosis of the tonsil he thought rare ; secondary forms, especially those occurring in pulmonary tuberculosis, were common. With tonsillar tuberculosis there was constancy of occurrence of the cervical lymph nodes. The writer referred to a number of cases of tuberculosis of the lymph glands occurring in children, and said the secondary enlargement of these nodes was of interest only as a complication of tuberculosis elsewhere. Owing to the greater activity of growth of lymph-tissue in children they furnished the largest percentage of cases of tuberculosis of the tonsils. At first it had been thought that these lymph nodes were infected from below, from the bronchial nodes, and that perhaps might exceptionally occur, but, as a rule, the tubercle bacilli entered the tonsil and infected the nodes from above. Cases of Friedman demonstrated this fact.

In a study of the faucial tonsils and the uvula in the tuberculous, Escomal announces the following conclusions: 1. Tonsillar tuberculosis is very common in the tuberculous. 2. The macroscopic diagnosis of this affection is very difficult. 3. The tonsils nearly always become infected by exogenous contamination. 4. The crypts are always filled with many species of micro-organisms. 5. Among these the bacillus of Koch is frequent in the tuberculous. 6. It is also found in a latent state in some persons who are not tuberculous. 7. The bacillus of Koch is sometimes found in the blood of the tonsillar vessels. 8. The uvula is rarely tuberculous.

In the *Wiener klin. Wochenschrift*, No. 36, Glas describes three cases of tuberculosis of the tonsils, two of which were primary and the third a miliary tuberculosis of the tonsils, with consecutive general infection by the lymph and blood routes. In all these cases the tonsil was hypertrophied. In one case, with a unilateral tonsillar affection, the corresponding vocal cord was involved. Tuberculosis in the tonsils seems to assume the form of a chronic, non-ulcerating sclerosis or to appear as miliary nodules.

OTOLOGY.

BY ROBERT L. RANDOLPH, M.D.

THE EXTERNAL EAR.

Ossifying Otitis Externa. The ear, unlike some other parts of the body, is not subject to peculiar diseases in certain parts of the world. So far as we know pretty much the same diseases attack the ear in temperate regions as in the tropics, but Müller¹ has very recently reported a peculiar affection which he has observed in a number of individuals who had sojourned a long time in the German colonies of Africa, in New Guinea, and in China. We find no record of the disease having been observed in temperate regions, and for this reason Müller thinks it should be regarded as a tropical affection. It starts in an insidious manner, the patients noticing at first that they are troubled with subjective noises and deafness, while the canal is decidedly narrowed as a result of the infiltration of the soft parts. In some cases this infiltration disappears rapidly when moist compresses are applied, while in other cases it persists for a long time, and causes considerable pain and fever. The duration of the trouble is from three weeks to several months, and sometimes it becomes chronic, presenting in such a condition very much the appearance which is seen in hyperostosis of the external auditory canal. In all the cases which were examined the middle ear was found in good condition, and in only one case was there an exostosis of the canal. When the subjects of this affection returned home the disease disappeared without any treatment, although it persisted for some little time after leaving the tropics. The question arises whether it is truly an affection peculiar to the tropics, and Müller proceeds to discuss this point. Painful infiltrations of the lining membrane of the canal have been observed among Europeans who were in the Cameroon, and Kaschke has reported cases in negroes in the same colony; on the other hand, the examination of the skulls of a number of Peruvians, Mexicans, and Australians by Seligman, Virchow and others disclosed the fact that there were a considerable number which had exostoses in the external auditory canal, and exostoses, according to the researches of Schwartze, are a great deal more

¹ Zeitschrift f. Ohrenheilkunde, xli., 1.

frequent in England than in Germany, and it will be remembered that England has been sending out its subjects to hot countries for a much longer period than Germany, long, indeed, before the latter country commenced to establish colonies. Taking all these things together, it seems that Müller's views are probably correct, and that we have actually an ear disease which affects Europeans who sojourn a long time in the tropics. This disease might be properly called an ossifying otitis externa. It remains now for the physicians who dwell in these countries to study the etiological conditions peculiar to this singular affection, and to suggest a successful line of treatment.

Dermatoses. In the so-called dermatoses of the external ear I have always found that the healing process was much facilitated if water was kept away from the ear, and that generally the application of either the yellow oxide of mercury ointment or of the salicylic acid ointment (2 per cent.) would be promptly followed by healing. The salve should be applied twice daily. The itching, which is often associated with eczema of the external auditory canal, is considerably relieved by adding a few drops of carbolic acid to the salicylic acid ointment. Magnan¹ has found that solutions of nitrate of silver, 1 : 10 or 1 : 20, are very useful when the disease attacks the canal. When there is considerable thickening of the skin it will be found necessary to rub the auricle well with soft soap or with an alcoholic solution of potash, after which an ointment should be immediately applied. He uses either tar ointment or ichthyol. In those cases where there is a vesicular eruption the auricle can be dusted with a powder of either oxide of zinc, calomel or subnitrate of bismuth. A powder containing one part starch and three parts salicylic acid is also very valuable in this form of the trouble.

Furuncles. I have frequently spoken of this subject, and it continues to be one of such practical importance that I will take this opportunity to call attention to a method which I have employed for years in treating furunculosis of the external ear, a method which, by the way, has been attended with success in the hands of others, judging from the favorable reports which I meet in literature. Sack² adopts the following line of treatment, one which he has followed for ten years or more in the ear clinic of Moscow: The canal is first thoroughly cleansed and dried, and then a cotton tampon, well impregnated with carbolated glycerin, and large enough to fit tightly the canal, is pushed well into the latter. I should say here that this tampon ought to make decided pressure on the walls of the canal, even though it

¹ Touraine méd., July 15, 1903.

² Monatschrift f. Ohrenheilkunde, January, 1903.

should cause pain by the pressure. I have not infrequently found that after the introduction of a tampon of this kind that the patient can sleep comfortably. Instead of glycerin I have recently used a 2 per cent. salicylic acid ointment, to every ounce of which I had added fifteen drops of carbolic acid. This tampon is removed every day and a fresh one introduced, and in the majority of cases the patient is well in a few days. In cases where there is a definite abscess, of course, an incision should be made, and this procedure should be followed up by inserting the tampon. The ointment, being such an excellent antiseptic, will prevent the glands along the canal from being infected, a very likely occurrence, and will help to ameliorate the pain which is so often felt after incision. Even after the incision has entirely relieved the pain it is well to continue with the pressure tampon for some days, and I usually have the patient wear one for at least ten days after all symptoms have disappeared, simply to prevent the further appearance of boils in this location. At such a stage it is unnecessary to change the tampon but once daily. I think it well to remember a precaution which someone has suggested in preparing the tampon. First cover the tampon well with the salve and then hold it above a flame and allow the salve to melt and be taken up by the cotton. Then spread on another layer of salve, and treat in the same way until the tampon is thoroughly saturated. If only one layer were put on it would soon melt from the heat of the skin, and would pass into the deeper layers of cotton and leave the rough irritating fibres in contact with the inflamed canal.

HOT, DRY AIR IN FURUNCULOSIS. Reich¹ has gotten good results in treating furunculosis in this location by using hot, dry air. He has never found that very hot, dry air had any destructive influence upon the skin, and no pain followed its application. He claims as a result a lessening of the virulence of the superficially situated bacteria, the production of active hyperæmia, which serves to promote phagocytosis, and rapid absorption of infiltrates, and, finally, local immunity. He has been able to put a stop to a boil in its early stages, to limit the extension of the infection, and to prevent further infection. Incision is unnecessary. He reports four cases in which the results were admirable. Particular note is made of the soothing effect of the application. He calls attention to the fact that the method is often found wanting in the presence of marked dyscrasia, as, for instance, diabetes. The heat is applied by means of what he calls a thermoærophor. It might be said that Beck² has been using superheated air at a temperature of

¹ Zeitschrift f. diätet. und physikal. Therapie, Band vi., Heft 12.

² Laryngoscope, May, 1903.

200° for a long time in treating affections of the middle and external ear.

THE HEARING IN FURUNCULOSIS. At the meeting of the German Otological Society on May 29th last, Scheibe¹ reported some observations which he has made on the hearing of those affected with furunculosis of the external auditory canal. So far as I know, this communication is a pioneer one on this special aspect of the question. As we know, deafness may be produced either by occlusion of the lumen or by a patent lumen through collateral œdema of the tympanum. Deafness here is not rare, though, as Scheibe remarks, we do not often note it. He has analyzed 149 cases, and of these 64 heard not quite normally. In one-half the hearing distance for whisper was three to six metres, in one-quarter one-half to three metres, and in the remaining one-quarter under one-half metre, and the greatest decline in previously normal hearing was whisper in 20 cm. It is worthy of note that the lower tone limit, bone conduction, and Rinne's test are similar to what are found in acute middle-ear inflammation. The prognosis is, of course, very favorable.

Otomycosis. Most authorities agree in thinking that this condition is simply an accidental complication of chronic inflammation of the external auditory canal, and not a clinical entity, so to speak. The *aspergillus nigricans* is the variety of fungus most generally found. The treatment usually consists in cleansing the canal with antiseptic solutions, and among these solutions bichloride of mercury in alcohol is the best. The insufflation of equal parts of boric acid and oxide of zinc has been recommended, and this I have tried with good results. Recently, Maurin² has been experimenting with injections of permanganate of potash. He attributes its great efficacy to its energetic oxidizing properties, as seen in its effect on organic matter. We are, of course, well acquainted with its remarkable antiseptic properties. It can be employed in the strength of 1:1000 or 2:1000, or even 5:1000 or 10:1000. This should be used twice daily. The epidermic covering of the canal and tympanic membrane bear this apparently strong solution very well. Maurin reports twenty-four cases treated in this way, and all successfully.

Anæsthesin in Ear Disease. It is well known that Haug has devoted considerable attention to the action of local anæsthesia in the ear, and he has recently³ been testing the claims of anæsthesin (Ritsert). He uses the powder in various combinations, as, for instance, with either alcohol and glycerin or with alcohol and water. The formula

¹ Archives of Otolaryngology, August, 1903.

² Thèse de Toulouse, 1903.

³ Archiv f. Ohrenheilkunde, Band lvi., S. 267-270.

which he generally employs is : anæsthesin, 4.0 ; alcohol, glycerin āā 25.0. The manner of its application is very simple. A piece of gauze is well soaked in the mixture and carried up into the canal as far as the membrane, and allowed to rest in this location. Usually the gauze is changed once in twenty-four hours, or it may be changed oftener. It is well to close the ear with a piece of cotton. He advises the use of this remedy, especially in inflammation of the external auditory canal. He has noticed prompt amelioration in the pain in from two to five minutes after the first application, and this relief persists for at least two hours. His experiments, however, do not indicate that anæsthesin exerts much influence upon the course of the disease, and this is particularly the case with oleaginous preparations of anæsthesin. The alcoholic solutions of anæsthesin, however, as well as the solutions in alcohol and glycerin, seem to put a stop to the development of the furuncle if it be employed in the early stage. Haug has found it of special value when combined with salicylic acid, naphthol, and carbolic acid in the treatment of acute and chronic eczema of the aural region, particularly in the diabetic, pruritus of the auricle, and also where the pruritus is of nerve origin. In these cases the itching is very intense, and this symptom is promptly relieved by the anæsthesin. In those cases where there is considerable moisture the insufflation of the powder itself mixed with a little boric acid will be found to do good service. He has tried the drug a number of times in paracentesis operations, but like most of the local anæsthetics used for this purpose, it was far from satisfactory.

THE MIDDLE EAR.

Treatment after Operations upon the Drum Membrane. In calling attention to the after-treatment of those cases where we have operated upon the drum membrane, Botey¹ advises a course of procedure which I have insisted upon for several years, namely, that no irrigation should be made immediately after opening the tympanic cavity, but that a small pledget of sterile gauze be introduced into the canal, and thus good drainage be preserved. Botey advises, however, that antiseptic irrigations should be made in cases where the membrane has been incised to let out an exudate. But even in these cases I think the irrigation may do harm by irritating a swollen and sensitive membrane. I am sure I have seen more than one case where an intense earache has been set up by an irrigation made immediately after incision of the drum membrane. All that is wanted at this stage is to have good drainage. Not infrequently twenty-four hours after an

¹ Rev. heb. de laryngol., etc., 1903, No. 22.

incision patients will have a return of the earache, and this is due to the wound being clogged with exudate. Moist heat in the shape of towels wrung out in hot water and applied over the region of the ear will almost always start the flow again and relieve the patient. If this does not succeed irrigations with sterile water very gently conducted into the canal will be apt to bring about the desired result. Not infrequently after the operation for mobilization of the stirrup or of breaking up adhesions we will have a slight hemorrhage, in which case Botey advises the following measure, of which we entirely approve: He introduces a strip or wick of aseptic gauze into the canal all the way up to the membrane, and capillary attraction will induce satisfactory drainage of the sanguinolent discharge from the field of operation. In this way we avoid decomposing blood clots. This strip is particularly necessary when we have used adrenalin, for the ischæmia which is produced by the latter is succeeded in a few hours by vasodilatation and consequent hemorrhage which fills up the bottom of the canal. After avulsion of the stump suppuration is quite frequent, and it is this complication which often completely nullifies the effect of the operation. When the oval membrane is lacerated there is generally an oozing out of the perilymph, and profound deafness results. Most otologists are very pessimistic when this condition is produced, and hold that infection of the labyrinth is almost certain; but Botey is not of this opinion, and he makes the statement that infection of the labyrinth from the pus of the tympanic cavity is very rare, and if the tear in the membrane is very small it soon cicatrizes or, at least, closes so promptly that the pus in the tympanic cavity has not had time to reach the internal ear. When the bone has been removed one must at once staunch the flow of blood which accumulates in the bottom of the canal, and this must be followed up with the insufflation of boric acid whenever the slightest humidity is observed, and if this secretion continues it will be necessary to make an application of nitrate of silver, 1:20. A wise piece of advice to follow after removal of the ossicles and tympanum is to keep the canal well filled with freshly sterilized gauze, which should be removed as soon as it becomes in the slightest degree damp. We may sum up the advice which has been suggested by Botey in these words: Prevent the entrance of infectious germs, and, if they should enter, inhibit or destroy their activity, and as soon as possible restore the mobility of the chain of ossicles.

Treatment of Acute Inflammation of the Middle Ear. This is a subject which is of such practical importance that it might be well to speak of it again, more especially of the treatment in the preoperative stage. Every year I have recorded in these reports my own and the observations of others in this connection, and, while I have nothing

new of unusual value to describe in the way of therapeutics this year, I shall refer to the subject in a few words. The points which I lay down now have been more or less well covered in my previous reports. Brunel,¹ in a very recent communication, lays great stress upon local bleeding in the earlier and painful stage. He advises the use of three or four leeches, which should be applied either in front of the tragus or over the mastoid process. This is a point which, it will be remembered, I have dwelt upon at length, and I can only say that I still regard it as one of the best means we have for cutting short inflammation. It should, of course, be employed in the early stage when the pain is intense and when the objective signs of tympanic inflammation are not yet very pronounced. Brunel suggests the instillation of phenated glycerin, 1:10, and at the same time a compress of the acetate of alum should be applied as hot as possible to the ear, and salicylate of soda given internally. The post-nasal cavities are treated with frequent inhalations of mentholated oil, and gargling is also advised. I am more and more convinced of the efficacy of gargling. The very act of gargling throws into action the muscles near the entrance of the Eustachian tubes and stimulates them to carry on their proper functions, and in this way we keep open the tubes and help to properly ventilate the tympanic cavity. Again let me say that I have found no reason yet to retract what I have said about inflating the middle ear at this stage of the inflammation. I never employ any form of inflation at this time. One can by this measure drive up other bacteria into the middle-ear cavity and produce a mixed infection which, according to the researches of Coussieux,² is always more dangerous than a suppurative process due to one organism. My views on the subject of incising the drum membrane are unchanged, and I think the sooner it is done the better after our measures for allaying pain have failed and more or less bulging of the drum membrane is present. I have never had to regret having performed this operation, and I have seen a number of complications which might have been averted had the drum membrane been promptly incised. After this is done I usually introduce a strip of either iodoform or bismuth gauze well up into the canal, and renew it from time to time, and in this way we can see that perfect drainage is kept up. Efforts to stop the discharge should not be instituted for at least forty-eight hours after the drum membrane has been opened, that is to say, after all the fulminating symptoms have subsided. Irrigating an inflamed and swollen drum membrane often brings on an attack of earache. All we want is good drainage.

¹ Rev. heb. de laryngol., d'otologie, etc., 1903, No. 23.

² Ann. des mal. de l'oreille, etc., May, 1903.

Iodoform Insufflations in Otorrhœa. According to Lednev¹ the insufflation of iodoform gives the best results in otorrhœa. He used the powder a number of times in soldiers who had chronic suppurative inflammation of the middle ear. Twenty-three cases were treated in all, and he obtained a permanent cure in twenty-two of these. In sixteen cases the tympanic membrane cicatrized, and in six others the perforation became smaller. The duration of the treatment was about forty-six days. He simply covers the walls of the canal with the powder, and then introduces into the canal an iodoform tent, and allows it to stay in this position as long as it remains dry. I appreciate the fact that iodoform is an admirable agent theoretically in these cases, but the smell is so abominable and far reaching that most private patients will not tolerate it, and one is forced to use some of the modifications of this drug, such, for instance, as aristol, which is distinctly beneficial. The great objection, however, to all the iodoform family is the fact that unlike boric acid they are insoluble in the exudate which fills the canal and tympanic cavity. This being the case, we often have not only the walls of the canal caked with the powder, but the perforation stopped up with a clump of tenacious paste. With the exception of boric acid this is pretty much what we always get when we use powder in suppurative inflammation of the middle ear. I might allude here to the fact that Gray² speaks highly of a solution of iodoform in aniline oil. It should be borne in mind, though, that aniline oil can cause toxic symptoms, a fact which I mentioned last year in speaking of Gray's solution of cocaine, aniline oil, and alcohol used as a local anæsthetic in operations upon the drum membrane.

Difference in the Size and Distribution of the Pneumatic Cells. Bezold³ discusses *otitis media suppurativa* in an instructive manner, and it is especially interesting as coming from one who has made so many valuable contributions to the treatment of this disease. In speaking of the protracted cases, he does not believe that the peculiar bacteria which happen to be present are responsible for the obstinacy of the affection, but that the explanation is to be found in the unusual differences in the size and distribution of the pneumatic cells; in other words, in anatomical peculiarities. This point he described several years ago, and is illustrated as follows: In cases which were operated upon and where the suppurative process had existed for several months, or had led to death through a complication, it was noticed that the empyema was found localized in pneumatic cells which were considerably larger than the normal, and this state of affairs was present even when the perforation no longer existed and the suppuration in the tympanic

¹ Rev. heb. de laryngol., d'otologie, etc., January 31, 1903.

² Lancet, April 18, 1903.

³ Archives of Otolaryngology, May, 1903.

cavity and antrum had disappeared. These observations were based upon an anatomical study of a number of cases, and since this time he always makes it a rule to operate when a suppuration has persisted for more than two months, and he has always found large cavities filled with pus and granulations, and at some distance from the antrum; so there is no doubt in his mind of the connection between an undue size of the pneumatic cells and a protracted suppuration. In those cases where there is a small collection of serous exudate in the middle ear either catheterization or Politzerization will suffice to bring about its absorption. In addition to this I have found in the case of adults that gargling with any mild astringent helped to keep open the Eustachian tubes and promoted the ventilation of the tympanic cavity. This treatment is, of course, applicable to children who are not too small. The gargle which I generally use is one which I mentioned several years ago, and it usually gives satisfaction :

| | |
|--------------------------------|-------------------|
| R.—Tinct. iodi | 3j. |
| Potassii iodidi | ʒij. |
| Spirit. vini gallici | ʒj. |
| Aquæ | q. s. ad. ʒiv.—M. |

Sig.—Two teaspoonfuls in a half glass of water, and gargle three times daily.

I have followed this treatment in a number of cases during the past winter, and have succeeded usually in bringing about a complete disappearance of the symptoms. It is surprising how the redness along the malleus handle and the blush which distinguishes the membrane disappear under these very simple measures. I remember, particularly, one case in which the patient had been advised to have the membrane incised and the serum let out. While these individuals always experience considerable discomfort, they never have the pain which is felt in an infectious inflammation of the middle ear. The exudate, which we find in the former case, is sterile, and by adopting the course laid down and, at the same time, guarding against exposure the symptoms will generally disappear in a few days. It is refreshing to see that Bezold gives such cordial support to early incision of the drum membrane, a step upon which I dwelt at length in my last year's report. After the incision in the membrane is made he employs the external air douche for freeing the tympanic cavity of the secretion.

Acute purulent otitis media is not the disease in which the antiseptic line of treatment is the principal thing. Unless an antiseptic application is absolutely unirritating it is apt to do more harm than good. Formalin and bichloride of mercury solutions to be effective as germicides must be made so strong as to generally cause pain. This has frequently been my experience, and in the acute form of suppuration of the middle ear I have abandoned both these agents and use now

either a sterile salt solution or a boric acid solution. If we could get a first-rate antiseptic solution which was as unirritating as either of these solutions just mentioned we would have an ideal weapon against infections of the middle ear. Until we get such an antiseptic we will have to content ourselves with keeping the ear as clean as possible and with promoting good drainage.

Packing the Canal. Another point upon which I have always laid much stress is the question of packing the canal with either boric acid powder or gauze, a procedure to which I strongly object. Bezold, in speaking of packing with gauze, says that in the last few years he has seen as many as twenty cases which had been previously treated in this way. In eleven cases the gauze plug had a very disagreeable odor, and in five it was very fetid. The bony canal was narrowed by a concentric swelling, and the drum membrane was covered with thick, irregular epidermic scales which rapidly undergo putrefaction. A survey of the complications shows four cases of empyema of the mastoid, two cases of gravitation abscess in the neck, two of caries of the mastoid, and one of necrosis of the labyrinth.

Disturbances of Hearing in Acute Suppurative Otitis Media. Ostmann¹ has made some very interesting observations upon the disturbances in hearing of those affected with acute suppurative inflammation of the middle ear. A number of cases were examined every day from the very beginning of the inflammation and through its entire course. On the basis of these investigations one cannot regard acute suppurative middle-ear inflammation as the type of pure middle-ear inflammation, for it partakes rather of the character of a labyrinthian affection, as is evidenced by a notable lowering of the upper tone limit. In the lighter cases this is, probably, to be accounted for by a transient hyperæmia, while in the severer forms we have no doubt a new formation of connective tissue inflammatory in character. In only one case did he fail to find this lowering of the upper tone limit, and in this case there were no subjective noises, and it is a matter of considerable prognostic importance to know that we cannot expect any rapid disappearance of these disturbances in the upper tones and of the subjective noises as long as we have this lowering in the upper tone limit. The author regards the recently modified Galton whistle as an essential not only for making a diagnosis but for aiding us in giving a prognosis of acute inflammation of the middle ear. Even the lower tone limit showed impairment in practically all the cases, but the lowering of both upper and lower tone limits showed vacillations from day to day. With Weber's test the tuning-fork could always be heard

¹ Zeitschrift f. Otiatrie, Band xlii., Heft 3.

on the diseased side, that is to say, at the height of the trouble, while the duration of the hearing almost always showed marked breaks. Generally speaking, the hearing capacity for the high octaves was reached first when recovery set in, while the lower octaves were often not heard for months afterward.

Otitis Media following Influenza. I have frequently remarked upon the intensity of the process when seen in connection with grip. The tendency, too, to cause necrotic changes being so great in this variety of infection, we are more apt to have intracranial lesions than in ear troubles following the exanthemata, and as S. Macuen Smith¹ says, the infection in these cases after the subsidence of the acute symptoms is so insidious that either mastoid or intracranial involvement in many cases is actually well advanced before the complication is discovered, and this occurs notwithstanding the physical symptoms denote marked improvement in the general condition. I am entirely in accord with the same observer when he places himself on record in decided language against the so-called paracentesis of the drum membrane. It is non-surgical in every sense of the word, and a free, clean incision reaching from the most bulging point downward to the lower border of the canal is the proper way to use the knife. A paracentesis usually means an opening which is too small, and consequently we get inadequate drainage. Generally speaking, we wait for bulging before incising the drum membrane, yet it has been suggested by Smith that in ear troubles complicating pneumonia, influenza, or one of the exanthemata a grave error would be committed if we should always wait for bulging, for these diseases are purulent from their inception. In such cases, then, when the pain is severe and is uninfluenced by blood-letting, we should incise without waiting for the classical sign of a bulging membrane. A point upon which too little stress has been laid in discussing this question is rest in bed. I regard it as of the highest importance that individuals with an acute inflammation of the middle ear be compelled to remain in bed until they have been free of temperature for at least two days. Such patients always have some fever, and it is a common thing for an individual to go around engaging in daily work in this condition. I have frequently had patients come to my office with a raging earache and a temperature of 102° F. or over, and they are often sent by the family physician. Such individuals should be in bed.

General practitioners in dealing with acute inflammation of the middle ear should get into the habit of using and of attaching more importance to the clinical thermometer.

¹ Laryngoscope, June, 1903.

Serious Constitutional Symptoms Originating in Otitis Media.

Some years ago I called attention in these reports to the investigations of Meltzer, Ponfick and others, showing that some of the serious constitutional disorders in infancy were kept up by the existence of suppuration in the tympanic cavity without the presence of any of the usual symptoms of inflammation in this locality. Recently, Morse,¹ making some investigations along these lines, reminds us that we cannot always depend upon earache in infants as the essential of middle-ear inflammation, and that many infants with acute inflammation of the middle ear give no evidences of pain at any time. It is a common impression that putting the hand up to the ear means earache, but oftener it means nothing more than that the baby is sick, as most of them when uncomfortable grab at the head and ears, and pull their hair. Acute inflammation of the middle ear is more often mistaken for pneumonia than for any other condition. The author reports nine cases in which the symptoms varied from those peculiar to pneumonia to those belonging to malaria, tuberculosis, and cerebral troubles, and which cases subsequent events showed to be due to the presence of an exudate in the tympanic cavity. These remarks are simply made to call attention to the importance of a thorough examination of the tympanic membrane of infants who exhibit serious constitutional symptoms which do not disappear under the usual treatment, as such symptoms may originate in an acute inflammation of the middle ear. The only reliable examination is that which is made with a small speculum, and there are one or two things which, as Buck² says, should ever be kept in mind in making an examination of this kind. In infants the soft walls of the meatus tend to collapse and lie in contact with each other. The general direction of the canal from the drum membrane is outward and upward. The annulus tympanicus, in which the drum membrane is set, and to which the membranous meatus is fastened very firmly, is itself feebly attached to the squamous portion of the temporal bone. It is evident, then, from these anatomical peculiarities that not only a very small speculum is necessary when we examine an infant's ear, but that considerable practice is essential in order to properly interpret the picture.

The Use of Carbolic Acid in Suppuration of the Middle Ear. In cases where the suppuration is very persistent and where there is a small area of denuded bone, McKernon³ has found carbolic acid very valuable. The head is placed in a horizontal position and the canal is filled with pure carbolic acid, which is allowed to remain in the canal for

¹ Journal of the American Medical Association, July 18, 1903.

² A Manual of Diseases of the Ear, p. 13.

³ Medical News, January 17, 1903.

about thirty seconds, when the canal is well syringed with pure alcohol. I have generally employed strong solutions of nitrate of silver in these cases, but McKernon's suggestion seems a very reasonable one, and worthy of trial. As to the use of hydrogen peroxide in the chronic cases, I have never been converted to thinking it of much value. The results have usually been negative, and yet I must say that I have never seen any of the ill effects which others have reported from its use.

The Use of the Syringe. A very common mistake which the general practitioner makes in treating cases of middle-ear suppuration is in the too frequent use of the syringe. The syringe, in my opinion, should not be employed oftener than twice daily. It is no uncommon thing to be told by a patient that their family doctor had advised syringing out the ear three or four times a day. Such frequent syringing lessens the integrity of the tissues and makes the part soft and flabby, and actually prevents healing. After the discharge becomes less abundant McKernon advises the instillation twice daily of a bichloride of mercury solution, 1:1000, with an equal part of absolute alcohol, and this is allowed to remain in the ear for several minutes. This acts as a stimulant and hastens the healing process, and it should be used less frequently as the case progresses toward recovery, and when a firm cicatrix has formed the instillation may be abandoned entirely. I ought to say here that I have had most excellent results within the past year (in cases where the above-mentioned measures have failed) with the use of the middle-ear syringe, particularly in those cases where the perforation is high up, as, for instance, when it is opposite the attic. The solution used has generally been twenty grains of boric acid dissolved in a half ounce each of alcohol and water, which after mixing should be warmed before injecting. The entire quantity is used at one sitting, and it should be repeated every day. I think this treatment should always be adopted when our usual irrigation methods have failed. It is a very direct way of reaching the diseased point. I prefer the nozzle with the point directed upward to the straight nozzle or point. Weak solutions of nitrate of silver have been recommended as valuable when used in the same way, but I have had no experience with other than the boric acid and 1:4000 bichloride solutions. Cures have been reported from the use of protargol used in the same way, it being less likely to irritate than the nitrate of silver. It is absolutely necessary when using the middle-ear syringe to inject an unirritating solution.

The Reaction for Rhodan (Sulphocyanides) in the Saliva in Diseases of the Middle Ear. In 1900 Muck found that the quantity of rhodan in the saliva underwent changes in the various diseases of the

ear, and he, furthermore, showed that the mucus of the nose and the secretion of the salivary glands contained rhodan. Jurgens established the absence of rhodan in both acute and chronic suppurative inflammation of the middle ear. This author attributes considerable importance to the presence of even a slight trace of rhodan in the saliva. If the external auditory canal is contracted even to the point of rendering inspection impossible, a negative or feeble reaction for rhodan speaks in favor of a middle-ear affection as opposed to furunculosis of the external auditory canal; on the other hand, a positive reaction is an indication of otitis externa. The prognosis of affections of the middle ear can be determined with considerable accuracy, for the appearance of rhodan in the saliva in the course of a middle-ear affection indicates the beginning of the recovery. Very recently Alexander¹ has gone over this subject with interesting results. In 35 cases of chronic suppurative inflammation of the middle ear 6 showed a positive reaction for rhodan, 18 gave negative results, and 4 showed feeble traces. The positive reaction then was present in 29 cases. Among these 35 cases the otitis was unilateral in 25, and in the other 10 it was bilateral. In all the cases operated upon the rhodan disappeared from the saliva immediately after the radical cure, but reappeared at the end of a certain time, generally the fourth week after the operation. In 20 cases of acute suppurative inflammation of the middle ear 12 showed an absence of rhodan, 2 showed its presence, and in 6 there were very faint traces. Perichondritis, otitis externa, and mastoiditis gave positive results. In acute catarrh of the middle ear the rhodan was either completely absent or was present in only the smallest quantity. In 6 cases of sclerosis of the middle ear the rhodan reaction was positive in only 1 case, while in diseases of the internal ear the reaction was unreliable. According to the researches of Grober the organism in certain general affections loses the power of decomposing completely the albuminoids, and as a result we find no rhodan in the blood and, particularly, in the saliva. In inflammation of the middle ear the disappearance of the rhodan depends undoubtedly upon irritation of the tympanic plexus. One would conclude from a study of this matter that the reaction for rhodan in the saliva has undoubted value in affections of the ear, for its absence or its presence in very faint traces speaks in favor of an affection of the middle ear. Immediately after the radical cure there is no rhodan in the saliva, and it reappears only in the course of the fourth week, and when this does recur it is a sign of a normal recovery. A bilateral destruction of the tympanic plexus can result in a total and permanent disappearance of rhodan from the

¹ Wiener klin. Wochenschrift, October 16, 1902; Vrach, 1903, No. 6.

saliva. From the prognostic point of view the reaction for rhodan has no value so far as the deafness itself is concerned. This seems to me a useful test to apply in certain cases where we are in doubt as to whether our remedies have effected a cure. It should seem from all this that cases of chronic suppuration of the middle ear which have been under treatment may be regarded as permanently cured when the rhodan reappears in the saliva, and that so long as it is absent, no matter if the otorrhœa has ceased, there is reason to believe that the middle-ear disease is only in abeyance, not cured.

Tuberculous Otitis Media. In my last year's report I referred briefly to this subject. A few months ago Grimmer¹ submitted the results of some investigations which seem worthy of record. It is well known that the tuberculous process in the tympanic cavity may reach quite an advanced stage before the external surface presents any pathological change. Of the three layers which we find in this location the middle or fibrillary layer is the one which offers the greatest resistance to the tuberculous infiltration, for it only yields after the mucous layer has ulcerated, and it is this fact which explains why we have multiple perforations. According to Grimmer, the idiopathic variety is very rare, and such a diagnosis is only admissible when we can exclude all possible sources of infection in this location. One should remember that adenoid growths are not infrequently the points of entrance and of localization of such infection. The most characteristic symptoms are the absence of pain, early paralysis of the facial nerve, caries, and multiple perforations. The granulations, instead of being red, are pale and bloodless looking. We may have hypertrophy of the mastoid ganglion. Sequestra, caries, and paralysis coming on late have not the same value as diagnostic points, and cholesteatomatous otitis is never a tuberculous one.

TREATMENT OF TUBERCULOUS OTITIS MEDIA. As regards the treatment of this variety of middle-ear disease, the same rules hold good as though we were treating any other form of middle-ear infection; in other words, cleanliness is of prime importance, and I generally employ irrigations of either boric acid or bichloride of mercury, 1:10,000. Formalin can be used in the strength of 1:5000 or 1:2000, but my experience with this agent is that it frequently irritates. General treatment, as Levy² says, comprises a maximum of fresh air and sunshine and a maximum of rest and a nourishing food.

W. Milligan³ thinks that in all cases of middle-ear disease of suspected tuberculous origin search should be made for the tubercle

¹ Zeitschrift f. Ohrenheilk., April, 1903.

² The Laryngoscope, May, 1903.

³ British Medical Journal, February 28, 1903.

bacillus either in the discharge, in the granulation tissue, or in the enlarged periotic glands. Inoculation experiments afford a ready and reliable means of proving or of excluding the tuberculous nature of the disease. A final or exact diagnosis is imperative both from the prognostic and therapeutic point of view. He frequently found tuberculous disease of the middle ear and accessory cavities among children and infants, and he found the disease most frequently secondary to tuberculous processes elsewhere in the body. Primary tuberculosis is, probably, of more frequent occurrence than is usually supposed, and the prognosis is always grave; yet suitably planned surgical intervention will often eradicate the disease, and in doing this he thinks it wisest to proceed in stages. He is also of the opinion that when less than 10 per cent. of hearing power remains no attempt should be made to preserve the organ as an organ of hearing, but that otherwise, and when the patient is in good health, a definite attempt should be made.

Contagiousness of Suppurative Otitis Media. In discussing this question I have usually expressed some doubt as to the disease in itself being contagious, though we all know that the various diseases or conditions which give rise to suppurative otitis media are often very contagious. Klug¹ narrates the histories of eleven patients, and he thinks the histories of these patients demonstrate the contagious nature of the affection, or, at least, show that there is a strong probability of such being the case. The cases which he reports were usually brothers and sisters who were attacked one after the other at intervals, say from two to six days. In one case the mother was attacked just after the daughter, and in another instance two babies which had been playing together were affected. The type was generally the same. A bacteriological examination showed the identity of the organism in several cases, which, of course, speaks for the possibility of contagion. There was practically no difference in the clinical history of the patient primarily and the patient secondarily affected. In two of the patients of each group there was no history of a preceding infectious disease. A study of the cases reported by Klug, and also of those reported by Lermoyez and others awakens the suspicion that acute otitis media may to some extent be contagious, and the question might well exercise our minds as to whether it would not be well to isolate this class of patients, especially when the disease breaks out in a family where there are a number of small children.

The Rotatory Bur in Middle-ear Disease. In cases where the pus production is limited to the attic, and where removal of the ossicles fails to relieve the otorrhœa, Koerner employs the rotatory

¹ Annales des maladies de l'oreille, du larynx, etc., August, 1903.

bur.¹ It should be said, however, as Sturm² has pointed out, that the bur is not as harmless as it would appear, as is evidenced by numerous cases of necrosis of the bone surrounding the field of operation, destruction resulting from the heat generated by the rapid rotation, and this, in large measure, can be avoided by stopping the bur every few moments and using the interval to mop away the blood. The bur, then, is serviceable only when anatomical conditions are favorable—that is to say, we must have a short, wide ear-canal allowing the use of a bur with a short shank. General anæsthesia can readily be dispensed with when the bur is used for the removal of necrotic areas from the labyrinth wall, but it should be used where the attic is to be opened. At the completion of the operation the cavity is to be irrigated, a tampon of gauze inserted, and a bandage applied. The only ill effect of the operation is tinnitus, which usually subsides in a few days.

Potts³ mentions the following symptoms as indicating the need of an operation: Profuse and long-continued otorrhœa, suggestive but not diagnostic of either antrum or mastoid involvement. Œdema behind the auricle is apt to be due to a furuncle, especially when there is a pain caused by traction on the auricle. Tenderness over the antrum is of great significance, especially when it persists, but this may be absent if the outer table is much sclerosed. He lays great stress upon the bulging tender upper posterior wall, which, if not relieved by the usual methods, calls for operation. A sinus, no matter where its location, is a positive indication for an operation. Epileptiform attacks which indicate possible central complication in the form of pressure. Marked and rapid failure of health seen more often in adults. Rapid fluctuations of temperature through several degrees constitute a most important sign in cases of pneumonia. Slow and thready pulse out of proportion to the elevation of the temperature, irregularity or sluggishness of the pupils, rigors, and convulsions. Tenderness and cedema over the occiput are very apt to be present when the sinus is involved.

Chronic Aural Catarrh. Two cardinal points must be kept in mind in dealing with the dry forms of middle-ear catarrh: First, the necessity of keeping the tubes open and of restoring the mobility of the ossicles, and in doing this we give our patient the best chance for restoration of function or, at least, for a more or less complete disappearance of the subjective noises. We are all familiar with the various methods of restoring the patency of the Eustachian tubes. Of these methods catheterization, in my opinion, is the safest and most generally

¹ Archives of Otology, December, 1902.

² Ibid.

³ American Journal of the Medical Sciences, July, 1903.

useful. Rourse¹ believes that catheterization should consist not only in the blowing in of air into the middle ear, but in the introduction of either a bougie or sound through the catheter, with the idea of traversing the tube through its entire extent. As he employs the word it means the introduction of a sound for mechanical dilatation of the canal. The bougie is medicated in character as a general rule. He usually dips the end of his bougie in a glycerin-iodine mixture and carries it well up into the tympanic cavity. Sometimes he uses the solution of resorcin, equal parts, in the same way. The bougie is left in place for five minutes, and then withdrawn. After four or five days this procedure is repeated, but a much finer bougie is used, and with this penetration can be carried farther. One knows when one has passed the isthmus of the tube by the disappearance of all resistance, and when we have reached this point we leave it in position for a few minutes. It may be necessary to use bougies of increasing diameter. Of course, it is necessary to use bougies of very fine diameter, but yet capable of passing the stricture. I have always preferred the celluloid bougies, and I regard them as the safest. These measures alone may bring about the mobilization of the chain of ossicles. Rourse advises the Seligman air-pump, which is run by an electric motor. He also suggests that this region be well swabbed with either resorcin or with iodoglycerin, and he makes the statement that oil of vaseline, in the shape of sprays, often causes disagreeable symptoms, and may even lead to serious trouble. In this connection, however, I must confess to never having seen any bad results, or have I heard of any, and I have usually found the menthol and glymol mixture the most valuable of the applications which can be made with an atomizer. It goes without saying that constitutional treatment in these cases is always indicated. The preparations of cod-liver oil, of iron, and of strychnine, avoiding those combinations which contain quinine, will be found to help the cause. Such, in brief, is the treatment which generally will be found to do all that can be done in this class of cases—that is to say, when the middle ear has retained most of its vitality and the internal ear is still found to functionate properly. In spite of these measures I cannot report the number of successes which are recorded by Rourse, who in the last six years has treated more than two hundred cases. His results are as follows: cures, 46 per cent.; improved, 34 per cent.; negative, 20 per cent. In those cases where the mucous membrane of the tube is completely atrophied and the chain of ossicles is ossified in its entire extent treatment will bring nothing but failure. But where the organ preserves to some extent its vitality we ought

¹ *Annales des maladies de l'oreille, etc.*, February, 1903.

always to try this method of treatment, clearly recognizing the fact that without any treatment deafness will result, and with treatment it is more than likely the hearing will be kept from getting any worse, and it may be improved.

The Electrolytic Bougie. Duel¹ is still a warm advocate of the electrolytic bougie in these cases, and I have no doubt but that in his hands some of them would find relief, but the method has not been taken up with enthusiasm, and the results which have been reported from various sources do not justify us in believing that it will ever become a popular procedure in the hands of aurists generally. Goldstein² is a great believer in the value of the bougie, but not in the electrolytic bougie. He thinks that the addition of the current may stimulate the muscles, nerves, and mucous membrane of the Eustachian tube, and thus enhance the value of the bougie, but he is rather skeptical as to the mechanical and electrolytic results. In speaking of the bougie Goldstein places it high, not only as a diagnostic but also as a therapeutic agent in all chronic affections of the middle ear. It is useful in all strictures of the Eustachian tube and where the lumen of the canal indicates a diameter diminished to less than $1\frac{1}{2}$ mm. In this class of cases the bougie should be used systematically, and it should be passed the full length of the Eustachian tube, and left in position for ten minutes unless the patient complains of pain, when it should at once be withdrawn. This step should be followed by inflation of the tube. This procedure should be repeated every third day until the patient can tolerate bougie No. 5, which is $\frac{1}{2}$ mm. larger than the average normal diameter of the Eustachian tube. He has found the bougie efficacious in cases where pneumomassage, catheterization, and Politzerization have entirely failed. He uses the black polished whalebone bougie. The period of treatment should last from three to six weeks, and if improvement does not show itself in three or four weeks after the commencement of the treatment the bougie had best be discarded. The most frequent contraindications are a feeling of fulness and dullness in the ear and an increase in the subjective noises, and where the patient makes complaints of this character the use of the bougie should be discontinued. I need not add that in the use of the bougie, gentleness in its introduction should always be kept in mind.

In this connection it will be remembered that I spoke last year of the use of the electric bougie in middle-ear catarrh. The views which I gathered from the literature of a year ago are not at all different from the views expressed by various authors during the past year. Both Pierce³ and Tansley⁴ give discouraging accounts, and I do not

¹ Laryngoscope, July, 1903.

² Ibid., January, 1903.

³ Ibid.

⁴ Ibid.

think that it will be shown to possess decided value over other methods of treatment. Pierce thinks that in a few cases, perhaps, where there is a soft exudate near the isthmus, it may be regarded as of some value. We must remember, however, that its use is not without some danger. I stated in my last report that it was even possible to wound the carotid with the sharp end of a metal bougie, and Tansley reports a case where a piece of bougie three-fourths of an inch long was found broken off in the Eustachian tube.

Resection of the Tympanic Membrane, Incus, Malleus, and Stapes. Ossicectomy. In speaking of chronic aural catarrh Barclay¹ thinks that there are certain cases which are undoubtedly susceptible of improvement through resection of the tympanic membrane, malleus, and incus, and even the stapes may be sometimes removed. I discussed this question of ossicectomy in my last year's report, and at that time I referred to the results which had been obtained by Gradenigo. Barclay speaks in a very positive manner, and it would have been better had he given in detail a report of some of his cases, as he says that "so far, without a single exception, any individual presenting a certain set of symptoms (which he enumerates), no matter of how long standing, may be relieved by resection of the auditory conducting mechanism proportionately to the distinctness of these symptoms." The test upon which Barclay depends is this: whenever a deaf person who is especially deaf to low-pitched tones, and who speaks habitually in a moderated or low tone of voice, hears better in a noisy place you may be sure that you are dealing with a condition of immobilization of the outer auditory conducting mechanism, and he is probably susceptible of relief through tympanic resection. Such an individual should be encouraged to hope for a prompt and permanent relief of his disability. If I mistake not, however, most of the cases in which this operation has been performed were generally similar to those which were described by Barclay, and yet my own experience and the reports made by others still lead me to think that this treatment is of doubtful value.

Galvanism. Two years ago Urbantschitsch reported a number of cases of old *catarrh of the middle ear* which had been much improved by the use of electricity (galvanism). He has more recently put on record another series of cases.² The effect which is produced is a catalytic one. The electrode points are especially constructed, and if both ears are affected one electrode may be introduced into one ear and the other electrode into the other ear. Cases in which the usual

¹ St. Louis Medical Review, February 28, 1903.

² Monatschrift f. Ohrenheilkunde, November, 1902.

treatment with catheterization had utterly failed gave good results with this treatment. When the application is made directly to the wall of the labyrinth the stream should be of feeble strength, generally from $\frac{1}{10}$ to $\frac{2}{10}$ milliampère. The duration of the sitting should be from five to fifteen minutes. The treatment should be tried at least three times a week, and sometimes as often as every day. He reports ten cases in which the results, while not brilliant, warrant a trial of the treatment which, at least, seems to exercise a beneficial effect upon these chronic cases of middle-ear catarrh. In many cases it is true the electricity produces slight, if any improvement, but in other cases after faithful treatment, kept up for several months, success has come.

Lumbar Puncture. Among the remedies which have been lauded for the relief of the symptoms, which are incident upon chronic aural catarrh, is lumbar puncture. Babinski¹ reports eight cases, in all of which remarkable results were obtained, inasmuch as the patient was invariably relieved of the subjective noises, and the deafness markedly improved. From the study of these cases it would seem that the tinnitus was the symptom which was most powerfully influenced by the lumbar puncture, for in every one of the cases the subjective noises disappeared as a result of one puncture, and in several of the cases there was also a disappearance of the mental disturbances which are sometimes found in this class of cases. In several of the cases there was a notable improvement in the hearing. It is well worth noting, too, that the duration of the results was most satisfactory, though it is too soon yet to draw positive conclusions. In one of the cases which was kept under observation for three months the improvement was maintained. As Lermoyez² remarks, there is good reason to think that the treatment is a valuable advance, and we simply want some reliable means of determining what cases are suitable for this special method.

In speaking of lumbar puncture Chavasse and Mahu³ are of the opinion that it is an exceedingly valuable means of diagnosing intracranial troubles of otitic origin, and that the operation is practically harmless. It is, of course, necessary to bear in mind that certain general diseases exert a certain influence upon the character of the spinal fluid. If the fluid is thick and discolored, or even clear, yet after centrifuging it is found to contain either bacteria or polynuclear leukocytes, or, perhaps, both, we are dealing with a *meningitis*. If the liquid is clear, or may be only slightly cloudy, and contains a great quantity of lymphocytes, we probably have a *tuberculous meningitis*. In abscess and septic sinus thrombosis and in serous meningitis, non-

¹ Soc. méd. des hôpitaux de Paris. Séance du 24 avril, 1903.

² Ibid.

³ Rev. heb. de laryng., d'otologie, etc., October 24, 1903.

infective in character, the liquid is clear, normal, and often increased in quantity. After injuries of the labyrinth or of the base of the brain, with aural symptoms, one will often have noticed the presence of reddish globules in the spinal fluid. It would seem, however, that the therapeutic value of lumbar puncture at the present time had shown itself rather uncertain, but by reason of the results which have been obtained in general medication, and in some cases of meningitis from ear disease, one would be justified in combining it with surgical intervention in cases where the situation does not appear to be clinically desperate. It has, at least, the advantage of demonstrating the curability of certain forms of meningitis, and I think we may well regard it as a decided advance in the line of the diagnosis of intracranial complications following ear disease.

Ozone. George Stoker¹ has strongly recommended ozone in the treatment of chronic aural catarrh. The ozone is pumped directly from the generating apparatus through a catheter up into the middle ear. The sitting lasts three to four minutes, and should be repeated several times a week. In all the cases there was considerable improvement in the hearing, especially for the voice, and the subjective noises generally disappeared promptly.

THE MASTOID.

Mastoiditis. From time to time I have alluded to the treatment of mastoiditis. The question as to whether the character of this treatment influences the recovery of normal hearing has recently been discussed by McCaw.² I need not touch upon the indications for this operation, for in this respect there is no great diversity of opinion, but will only refer to the postoperative treatment. McCaw adopts two methods: irrigation with packing, and the dry method. When the first method was employed the wound, as well as the external auditory canal, was irrigated with a 1:5000 bichloride solution, and the wound was then packed with iodoform gauze. With the dry method the wound is dusted with a mixture of boric acid and packed with iodoform gauze, and a strip of the latter is pressed into the external auditory canal. The author thinks that the dry treatment is to be preferred. After the irrigation 50 per cent. recovered with normal hearing, while 63 per cent. recovered with normal hearing after the employment of the dry method. Frequent irrigations of the middle ear, as I have said in speaking of the treatment of suppurative otitis media, produce a certain amount of traumatism and irritation, and this, McCaw thinks,

¹ Lancet, November 1, 1902.

² Laryngoscope, April, 1903.

results in some loss of function. This explanation may be the correct one, but I doubt very much whether the irrigation should be held responsible for the loss of function. I have tried both methods, and have long since given up the irrigations, as I found that the healing process was invariably shorter when I used dry dressings, which we know produce conditions relatively less favorable to sepsis. I prefer the bismuth to the iodoform gauze. I should say, however, that I have found hot irrigations very valuable in alleviating the pain which often follows this operation when the wound is tightly packed with gauze, and I have seen some cases where the packing had to be removed, and simply a loosely-fitting tent introduced. Usually the pain is relieved by hot boric acid irrigations. After the radical operation von zur Muehlen¹ omits the packing, and allows the patient to practice the irrigation as often as twice a day, for in this way he says the irrigating secretions are removed, the newly-formed delicate epithelium is protected from maceration and is permitted to spread. He has never seen any harm come from these irrigations; in fact, the cavities seem to be always clean and healthy, and to be rapidly covered with epithelium without the irritating eczema, which we not infrequently see. In cases where there is a very fetid discharge and irrigation alone does not suffice, a 10 per cent. naphthalin solution may be instilled. It is needless to say that these irrigations must be made very gently in order to avoid exactly what McCaw says might happen, namely, bruising and irritating the tissues of the middle ear.

Course of Facial Nerve. Bearing upon this question of the radical operation Randall,² in speaking of the chance of injury to the facial nerve, and basing his statements upon an anatomical study, concludes that the descending course of the facial nerve to its stylomastoid exit in all the cases which he examined was almost exactly vertical, and crosses the oblique plane of the tympanic membrane some 3 mm. back of the middle of the posterior margin of the annulus. Therefore, in removing the back wall of the meatus we should aim to cut a little below the tympanomastoid suture if we would keep in safe territory. The course, then, of this nerve is variable, and Randall's suggestion is timely. The influence, however, of packing in cases where facial paralysis has occurred is not to be underestimated, for a number of observations show that the packing was responsible. In a discussion of this subject before the New York Academy of Medicine Jordan³ makes some sensible statements, among which I find the following points emphasized: He dwells upon the importance of an accurate knowledge

¹ Archives of Otology, April, 1903.

² Ibid., April, 1903.

³ Ibid., p. 164.

of the anatomy of the temporal bone and its surroundings, a knowledge which can only be obtained by persistent dissecting work on the cadaver, added to this a considerable amount of mechanical skill, especially in the use of the chisel, is necessary. Finally, the after-treatment demands the utmost patience, it being our aim to keep the cavity which we have obtained wide open and accessible throughout; to prevent the formation of new partitions and pockets, and to help along in various ways the covering of the walls with a permanent epithelium. I have over and over again in my earlier reports discussed the indications for the radical operation, and I shall not touch now upon this aspect of the question further than to say that the radical operation would, probably, not be found necessary so often were conservative measures, such as I have repeatedly described, persistently and conscientiously tried for a considerable length of time. But when this operation is determined upon let no one attempt it who is not thoroughly familiar with the anatomy of this region.

In speaking of the mastoid operation McKernon¹ believes in exposing the entire process, and even in freeing the tip from its muscular attachments. He also makes the statement in the same place (and a very useful suggestion it is) that the posterior canal wall should not be left too prominent, for if there be a deep cavity behind it the auricle in healing is liable to be displaced and thrown forward into a more prominent position than it formerly occupied, causing an unsightly deformity. To avoid this a small portion of the superior border of the canal should be removed with either the forceps or the curette.

The Depth of the Mastoid Antrum. In looking over what various authors have said in regard to the surgical anatomy of the antrum, one will be surprised to find what diversity of opinion exists as to the depth of the antrum—that is to say, the depth beyond which it is not safe to proceed when we are operating in this locality. Politzer says it is not safe to go beyond 15 mm., and Gruber agrees with him, while Broca states that even if the antrum is not reached at a depth of 25 mm. the surgeon should not be afraid to go farther. Buck places the danger-point over three-quarters of an inch, Dench, seven-eighths of an inch, Schwartz, one inch. Kerrison² has taken up this question, and has given us some interesting and valuable information. Thirty bones were taken at random, and sections made so as to expose the antrum in such a manner that it was easy to measure the thickness of the bone separating it from the mastoid cortex. The measurements show that most text-books fail to note the fact that great variations exist in the length of the bony canal in different temporal bones, and that the

¹ Laryngoscope, June, 1903.

² Archives of Otolaryngology, June, 1903.

depth of the antrum is always less by actual measurement than the postero-superior canal wall. Kerrison's conclusions are, in operations upon the mastoid, that the antrum should always be approached from the nearest point upon the cortex, which, in the majority of cases, will be found in the triangular space just behind the spine of Henle, and that this area furnishes us with a guide to the site of the antrum, and furnishes us fairly accurate data as to the depth beyond which it is not safe to proceed. The depth of the antrum is always less than the length of the postero-superior wall of the meatus, and in the majority of cases it is not over 12 mm., and is often less than this, and is never greater than five-eighths of an inch. Hence, in a surgical attempt to open the antrum a depth of five-eighths of an inch should be regarded as the extreme limit of safety. Kerrison's communication is accompanied by some instructive original drawings by Dr. H. J. Prentiss.

Radical Mastoid Operation. I have a number of times adverted to the so-called radical operation when speaking of the treatment of mastoiditis and chronic suppurative inflammation of the middle ear, and I have on those occasions always expressed myself very conservatively on the subject. These views have undergone no modifications during the past few months; indeed, time has only served to convince me that a still louder note of conservatism should be struck. Fatal cases after this operation are not rare, and there is a large percentage of cases whose hearing is impaired after this operation—a possibility upon which I have previously dwelt. Facial paralysis is also not infrequently seen, and no doubt this latter is due to the fact that the facial nerve often follows an eccentric course, as Randall¹ and Schwartze² have pointed out. When confronted with intracranial complications we must, of course, operate, but a chronic otorrhœa, in my opinion, is not a condition in itself to call for operation, and, as Harris³ says, to regard every case of suppuration as a slumbering volcano or a charge of dynamite, is extreme to say the least. The same author has compared the relative proportions of cures obtained from ossiculectomy with those obtained by the radical operation, and he found the results about the same, while the interference with the hearing has been very much less in the former than in the latter procedure. Harris' conclusions express so exactly the views I have held upon this question that I give them in full. Chronic otorrhœa in a large percentage of cases is amenable to medicinal treatment, in addition to proper attention to diseases of a general character and to the nasopharynx. Peroxide

¹ Archives of Otology, April, 1903.

² Archiv f. Ohrenheilkunde, Band lvii., Heft 1 u. 2.

³ Section of Otology, New York Academy of Medicine; Archives of Otology, June, 1903.

of hydrogen, with or without formalin solution, gives the best results, which, in a good number of cases, are permanent. The risk of an uncured otorrhœa with good drainage is relatively small ($\frac{1}{2}$ of $\frac{2}{3}$ per cent. of fatalities). Medicinal treatment, failing after a suitable interval of time, the danger of fatal complications in absence of all symptoms should be laid before the patient, and the promise of relief by operation stated where there is no reason to the contrary, such as intracranial or mastoid complication. The intratympanic method by ossiculectomy should be preferred inasmuch as its results as regards cures are equally good, and the risk of loss of hearing is vastly less, the danger of unpleasant sequelæ, as facial palsy, is avoided, and the possibility of a prolonged after-treatment is obviated. It should be remembered, too, that the radical operation is not without risk of life. When ossiculectomy fails or symptoms are present which point to extension of the disease into the bone, the radical operation becomes the suitable and valuable means of relief. The protecting and assisting power of nature is never to be lost sight of.

WILDE'S INCISION. This is another point to which I have frequently alluded in these reports, and I have always tried to bring out the fact that this method of operating upon the mastoid is ineffective. Ray¹ discusses the question and looks at it in much the same way. He reports four cases, in all of which this incision had been made, and where a second and complete opening of the mastoid became imperative. Two of these patients died, and in a third case there was a permanent facial paralysis. The other case recovered. All four cases illustrate, however, the inadequacy of the Wilde incision.

Constant Heat in Mastoid Diseases. Constant heat in these cases has been made the subject of a communication by Alexander,² of Politzer's clinic. The heat is applied to the ear region in much the same way as the Leiter coil. The tubes which compose the coil, however, are a little larger than those of the Leiter apparatus. The apparatus was devised by Ulmann for the purpose of applying heat to various parts of the body, and has simply been brought into service by Alexander in the treatment of *periostitis of the mastoid*. The coil is covered with damp cotton and applied to the mastoid, and kept in position by a light bandage. The patient should be in bed, and the application should last from one to seven hours. The temperature of the water should be always about 44° to 46° C. (111.2° to 114.8° F.). He reports eighteen cases, and among these the apparatus seems to have been of substantial benefit in seven. In three of the cases the

¹ Laryngoscope, October, 1903.

² Monatschrift f. Ohrenheilkunde, September, 1903.

coil was not borne with comfort, and it was removed. In the remaining seven cases the constant heat was found most grateful, but still operative interference was subsequently found necessary. It seems to me that the apparatus in certain cases is a valuable therapeutic agent. These cases are those which are to be regarded or characterized as especially fresh in character, and in which there is no general involvement of the mastoid process. When we have an abscess we can only hope for an amelioration of the pain.



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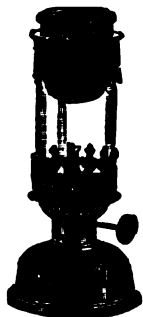
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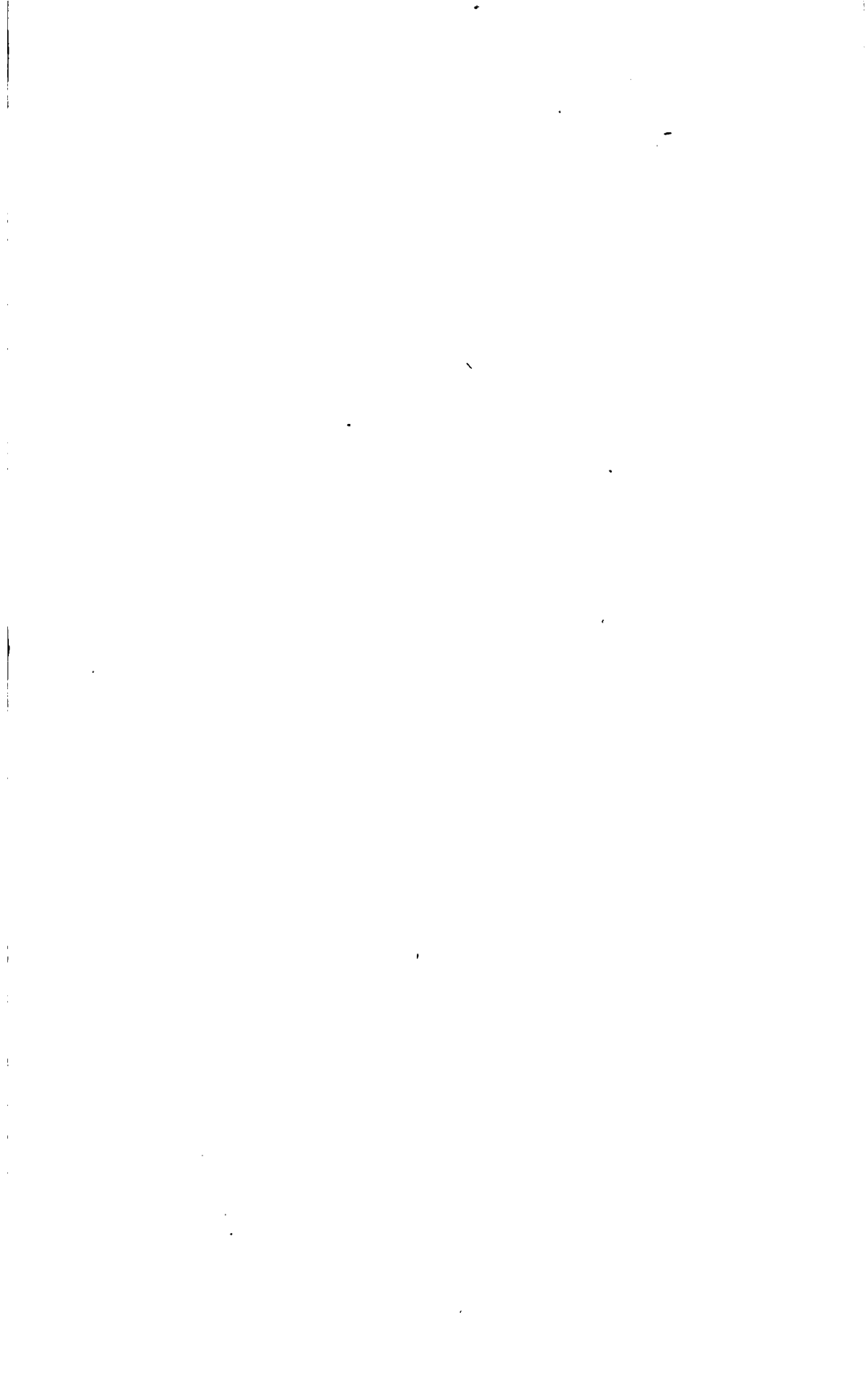
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